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THE GENETIC EVALUATION OF A TAXONOMIC CHARACTER IN DITHYREA (CRUCIFERAE)

REED C. ROLLINS

Developing accuracy in the evaluation of plant characters and characteristics for taxonomic purposes is a long-standing problem. When differences are found between groups of plants which otherwise appear to be related, the immediate question arises as to what these differences mean. Specifically, what do the differences mean in terms of the genetic make-up of the natural group to which such plants belong and how valuable are they as taxonomic criteria? In our efforts to interpret speciation in relation to a given species or a group of species, we wish to rely upon those characters as indicators of relationship (or lack of it) that are so deeply seated in the genetic constitution of the species that they cannot be easily obliterated or greatly modified by the direct effects of any given simply segregating factor or combination of segregating factors. In general, the kinds of characteristics that offer the greatest possibilities for taxonomic reliability are those that are dependent upon a multiplicity of genes and gene combinations for their ultimate expression—genes that are not in a single linear sequence of interdependency, but genes in many series whose interaction in a highly complex way results in the final structure or function. It may also be suggested that any given characteristic thus dependent upon a complex genetical system, which is deeply situated within the genotype, becomes protected from radical changes by the build-up of interdependencies between it and other characteristics, some of which may be vital to survival. Thus the species phenotype persists over many generations, little altered in basic pattern by the

numerous minor segregations that account for the usual variation present.

At the other end of the scale, characteristics under the control of the simplest gene systems are expected to be least reliable as the basis for classification. Such characteristics would be easily modified or suppressed by repetitious mutations, gene rearrangements or by ordinary segregation. In consequence, it is probably accurate to say that the more simply a character-difference is inherited, the less reliable it is as a criterion of speciation. The converse of this proposition, that the greater the complexity of inheritance of a character-difference the more reliable it is as a criterion of speciation, seems equally tenable. In trying to evaluate a given genetically controlled characteristic, an important attack on the problem is to determine the relative complexity of its inheritance.

One reason that taxonomic characters *per se* have not been frequently subjected to genetic analyses is that this is very time consuming and relatively unrewarding. The results of such experimental work, though answering the specific question regarding the nature of the taxonomic character, often do not have broader implications. Generalizations can only rarely be made because the applicability is or may be restricted to the immediate group under investigation. However, it is important for the long term to have many more cases worked out than are now known. Ultimately these will provide safe guides to proper character-evaluations, which is one of the current needs of taxonomy.

In working with the *Cruciferae* over a period of years, I have often encountered situations where "presence" or "absence" of trichomes appeared to be of trivial significance (1940, 1952). However, without actually testing a given case, it was not possible to know whether the absence of an indument in a given population, in an otherwise pubescent species, was environmentally induced or whether it was under genetic control. An opportunity to experiment with the presence and absence of a dense covering of trichomes on the fruits of *Dithyrea Wislizenii* Engelm. came when a population of this species was found having both glabrous- and pubescent-fruited types growing together near Sacaton, Arizona. The fruits of individual plants of both the glabrous type and the pubescent type were collected



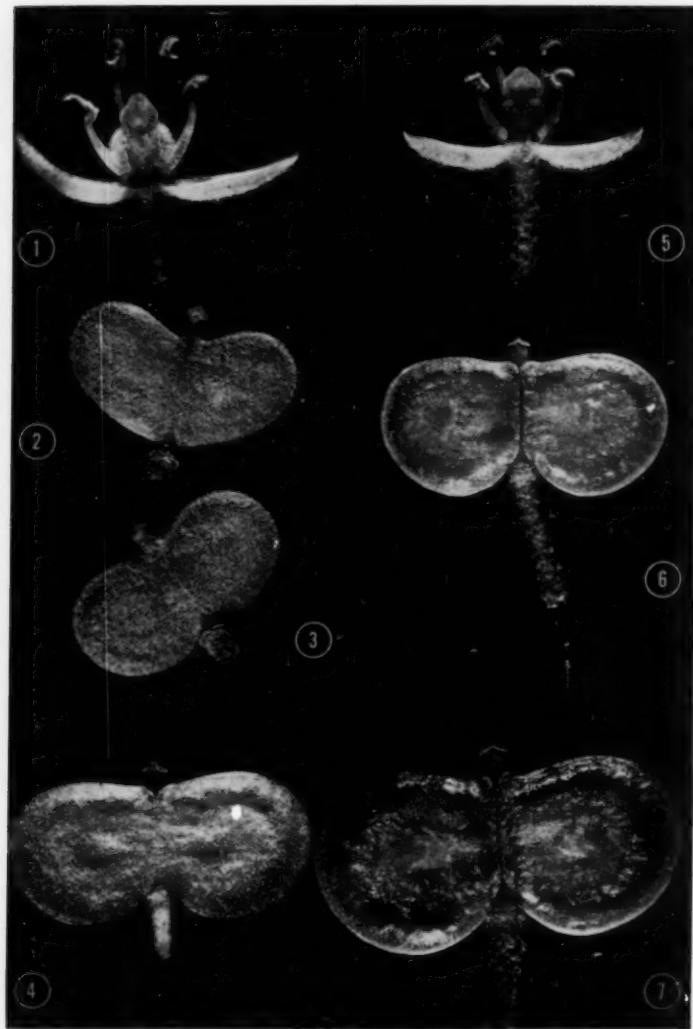


PLATE 1233. Flowers and fruits of *Dithyrea Wislizenii* Engelm. Fig. 1-4, a developmental series from flower to mature fruit of a pubescent-fruited type. In fig. 1, the petals, 2 sepals and the 2 near stamens have been removed to make the ovary visible. The same applies to fig. 5. Fig. 5-7, a developmental series from flower to mature fruit of a glabrous-fruited type.

and kept separate for testing purposes. The difference between the glabrous siliques and pubescent siliques is very striking, as may be seen in Plate 1233. The objective of the following experiments was to determine the genetic nature of glabrous vs. pubescent siliques in this species.

THE WILD POPULATION

The species, *Dithyrea Wislizenii*, extends from western Oklahoma and Texas to southern Utah and Nevada, and to Arizona and northeastern Mexico. It is common in sandy and loose granitic soils and often forms large stands composed of several thousands of individuals. Up to the present, a single glabrous-fruited *Dithyrea*, presumably closely related to *D. Wislizenii*, has been recognized as being of some taxonomic worth. Wooton and Standley (1913) originally described it at the species level as *D. Griffithsii* and it was later reduced to varietal rank by Payson (1918) under *D. Wislizenii*. In the Sacaton population, which provided the material for the following experiments, most of the plants possessed pubescent fruits, but there was a goodly number of glabrous-fruited individuals. Circumstances did not permit a definite count of pubescent vs. glabrous plants in the wild population. However, a rough estimate was recorded suggesting that the pubescent type predominated at least three to one. There were no intergrades. The wild plants possessed either glabrous fruits or pubescent fruits and none showed a gradation from one condition to the other.

PROGENY TEST OF SEED PARENTS

Four lots of seeds from the wild population were grown to provide plants for crossing purposes. Each seed lot came from a single wild plant, which had been open pollinated under natural conditions. The plants of culture numbers C-1 and C-4 were produced from glabrous-fruited parents, C-2 and C-3 were from

TABLE I
WILD PLANTS PROGENIES

Plant No.	Siliques	No. Glabrous	No. Pubescent
C-1	glabrous	9	3
C-2	pubescent	0	15
C-3	pubescent	0	10
C-4	glabrous	5	9

pubescent-fruited parents. Table I gives the classification of the plants of each culture.

It is of some interest that the progenies of both pubescent plants turned out to be uniformly pubescent even though there had been no pollen control on the parent plants.

Pollen mother-cell smears were made to reveal the chromosome number of both glabrous and pubescent plants. In each case the number $n=5$ was found.

CROSSES AND RESULTS

Three types of crosses were made using various combinations from the four cultures originally grown from the wild plants listed in Table 1. These were glabrous \times glabrous, glabrous \times pubescent, and pubescent \times pubescent. In addition, 14 pubescent plants were placed together in an isolated greenhouse where interpollination was permitted to be effected by the insects normally present. In each of the three types of controlled crosses, bagging with muslin, emasculation and hand pollination were practiced. Controls to check the procedures were carried along with the experiments. These showed that pollen control was effective. All crosses were carried out reciprocally. Essentially the same results were achieved regardless of the direction in which the pollen was carried except for the reciprocal of

TABLE 2. GLABROUS \times GLABROUS

CROSS	PROGENY			3:1 RATIO	CHI-SQUARE
	No. plants	No. glabrous	No. pubescent		
C1-1 \times C1-3 reciprocal	17	12	5		
	7	5	2		
	—	—	—		
C1-4 \times C4-9 reciprocal	24	17	7	18:6	.16
	20	15	5		
	6	4	2		
C1-7 \times C4-7 reciprocal	—	—	—		
	26	19	7	19.5:6.5	.05
	12	9	3		
	8	7	1		
	—	—	—		
Total	20	16	4	15:5	.266
	70	52	18		.287
				P = .98-.95	

pubescent C1-5♀ × glabrous C1-7♂. In this case, the reciprocal did not produce any filled seeds. The significance of this failure was not determined.

In addition to the results shown in Tables 2, 3 and 4, fourteen progenies of pubescent plants open pollinated from pubescent plants were grown. These amounted to 159 plants, all of which possessed pubescent siliques.

TABLE 3. GLABROUS × PUBESCENT

CROSS	PROGENY			1:1 RATIO	CHI-SQUARE
	No. plants	No. glabrous	No. pubescent		
C1-7 × C1-5 reciprocal	0 10 — — 10	0 3 — — 3	0 7 — — 7		
C1-6 × C4-8 reciprocal	12 11 — — 23	3 4 — — 7	9 7 — — 16	5:5	1.60
C4-13 × C4-6 reciprocal	6 14 — — 20	4 5 — — 9	2 9 — — 11	11.5:11.5	3.52
C4-10 × C4-14 reciprocal	17 6 — — 23	6 3 — — 9	11 3 — — 14	10:10	.20
Total	76	28	48		1.08 6.40
Pooled Chi-square (1 df)					P = .2-.1 5.26
Heterogeneity Chi-square (3 df)					P = .05-.02 1.14 P = .3-.7

The results are easily explainable if it is assumed that a single gene pair is operative in producing the glabrous or pubescent condition of the siliques. From the data, it is obvious that the pubescent plants are homozygous and recessive. Thus the genotype of the pubescent plants may be designated *gg*. When such a plant is crossed with a glabrous heterozygous individual (*Gg*), the resulting progeny should show a 1:1 ratio of glabrous to pubescent plants. In table 3, results from four different crosses between glabrous and pubescent plants are given and the Chi-square test for goodness of fit to a 1:1 ratio is provided. The

TABLE 4. PUBESCENT X PUBESCENT

CROSS	PROGENY	
	No. glabrous	No. pubescent
C2-7 × C2-8	0	11
reciprocal	0	1
	-	-
	0	12
C3-2 × C3-9	0	10
reciprocal	0	8
	-	-
	0	18
C3-6 × C3-7	0	13
reciprocal	0	28
	-	-
	0	41
C4-11 × C4-12	0	17
reciprocal	0	30
	-	-
	0	47
Total	0	118

numbers of plants in the various progenies are small and the possibility of results different from those shown should perhaps not be ruled out completely. However, the evidence strongly favors a 1:1 ratio and the assumption of a heterozygous (*Gg*) plant as the glabrous parent in each cross seems justified.

If heterozygotes are crossed, a 3:1 ratio of glabrous to pubescent is to be expected. Table 2 gives the data on three glabrous × glabrous crosses and the results show convincingly that a 3:1 ratio of glabrous to pubescent was obtained. It seems perfectly safe to assume that each of the six parents was of the constitution *Gg* with respect to the genes in control of the glabrous vs. pubescent condition. Evidently no homozygous dominant plants were used in the experiments. Such plants could not be distinguished from the heterozygotes phenotypically.

DISCUSSION

The mechanism of genetic control of glabrous vs. pubescent siliques in *Dithyrea Wislizenii* is obviously a relatively simple one. For this reason, it is safe to reject the phenotypic characteristic of glabrous siliques as having no significance for taxonomic purposes. Plants with this characteristic are expected to occur without respect to phylogenetic relationship in the populations of the species. In fact, this is exactly what one finds.

Glabrous-fruited plants are found in *D. Wislizenii* proper and in *D. Wislizenii* var. *Palmeri*. Furthermore, glabrous-fruited plants are found more or less throughout the geographical range of the species. On the basis of collections in the Gray Herbarium, the pubescent type appears to be more common than the glabrous. Collectors evidently distinguish between the glabrous and pubescent plants in the field because there are but three mixed collections among 84 different ones available in the herbarium. Six of the collections have glabrous fruits and 75 have pubescent fruits.

In my own field experience, I have examined four different populations of *D. Wislizenii*, one in Texas, two in Arizona and one in New Mexico. In three of these populations, I was unable to locate any glabrous-fruited plants. The fourth population yielded the material reported on above. This evidence added to that from herbarium material makes it quite clear that pubescent-fruited plants predominate in the species. If pubescent siliques represent the homozygous recessive condition, as indicated by the analysis of the one population, a more prevalent occurrence of the glabrous type would be expected throughout the species as a whole unless there are positive factors operating to select against it. However, we have no way of knowing about this at the present time. One observation may be pertinent to any ultimate explanation for the prevalence of the pubescent-fruited type. It is that the plants of *D. Wislizenii* are self incompatible. The chances of the accidental establishment of predominantly glabrous-fruited populations through isolation are considerably reduced as compared with a self compatible species.

CONCLUSIONS

The glabrous-fruited condition in *Dithyrea Wislizenii*, which provided the chief basis for describing *D. Griffithsii* Wooton and Standley as a separate species, is a simply inherited characteristic under single gene control. Glabrous-fruited heterozygotes when crossed produce a simple mendelian 3:1 ratio of glabrous- to pubescent-fruited plants. Glabrous-fruited heterozygotes crossed with pubescent-fruited plants produce approximately a 1:1 ratio of glabrous to pubescent plants. Pubescent-fruited plants crossed with each other produce only pubescent-fruited offspring. The pubescent plants studied all proved to be

homozygous and recessive for the pubescent fruit character. The presence or absence of pubescence on the siliques of *D. Wislizenii* is of no taxonomic significance.

—GRAY HERBARIUM OF HARVARD UNIVERSITY.

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A TAXONOMIC STUDY OF THE GENUS PHYSALIS IN NORTH AMERICA NORTH OF MEXICO

U. T. WATERFALL

(Concluded from p. 142)

Among the 481 sheets of 450 collections studied, material has been seen from Manitoba, Ontario (*Macoun* 54525, NY) and Quebec (*Marie-Victorin* et al 46421, GH) in Canada, and in the United States from: Alabama, Arkansas, Colorado (Boulder and El Paso Cos.), Connecticut, Delaware, Florida (Lafayette Co.), Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana (*Short*, NY), Maine (Cumberland Co.), Massachusetts, Michigan, Minnesota, Mississippi (University Campus), Missouri, Nebraska, New Hampshire (Coös and Merrimack Cos.), New Jersey (Middlesex Co.), New York (Staten Island), North Carolina, North Dakota, Ohio (Lorain Co.), Oklahoma, Pennsylvania (Chester Co.), Rhode Island, South Carolina (Aiken Co.), South Dakota, Tennessee, Texas, Utah (Washington Co.) Virginia, Washington D. C., West Virginia (Monroe Co.) and Wisconsin.

9b. *P. virginiana* Miller, var. *subglabrata* (Mackenzie and Bush) Waterfall, comb. et stat. nov., based on *P. subglabrata* Mackenzie and Bush, Trans. Acad. Sci. St. Louis 12: 86-87. 1902.

Plants nearly glabrous, or with a few short antrorse hairs; leaf blades mostly ovate to ovate-lanceolate, their margins usually entire, sometimes slightly sinuate-dentate; anthers tinged or margined with blue or violet; fruiting calyces mostly 25-35 mm. long and 20-30 mm. wide.

TYPE: *K. K. Mackenzie* collected at Sheffield, Jackson Co., Missouri, June 14, 1896 (NY).

This variety grows in woods, grassland, roadsides, fields, and other disturbed sites, primarily in the northeastern United States, but with scattered collections elsewhere; it flowers mostly from June to September.

Four hundred thirteen sheets of 267 collections have been studied. This taxon occurs in Ontario, Canada, and in Arkansas, Colorado (Gunnison and Routt Cos.), Connecticut, Delaware, Georgia (Wayne Co.), Idaho (Ada, Canyon and Payett Cos.), Illinois, Indiana, Iowa, Kansas (Douglas, Ellis and Shawnee Cos.), Kentucky, Louisiana (East Feliciana and Grant Parishes), Maryland, Massachusetts, Michigan, Mississippi (Coahoma Co.), Missouri, Nebraska (Kearney and Nemaha Cos.), New Jersey, New Mexico (Lincoln Co.), New York, North Carolina, Ohio, Oklahoma (Rogers and Tulsa Cos.), Oregon (Polk Co.), Pennsylvania, Rhode Island, South Carolina (Pickens Co.), Tennessee, Texas (Delta, Nueces and Potter Cos.), Utah (San Juan and Sanpete Cos.), Virginia, Washington D. C., West Virginia, Wisconsin.

Sometimes forms are found with larger fruiting calyces which are 4–5 cm. long and 3–4 cm. broad. These may be called *Physalis virginiana* f. *macrophysa* (Rydberg) Waterfall, comb. et stat. nov. based on *P. macrophysa* Rydberg, Bull. Torr. Bot. Club 22: 308. 1895.

TYPE: Since Rydberg cited several number without choosing a type, the author selects as LECTOTYPE A. A. Heller 1756 (NY); isolectotypes: (NY, UC).

Although the latter name antedates *subglabrata*, the author has chosen to transfer the name *subglabrata* to varietal status, since it is associated with a large, wide-spread population, primarily of the northeastern United States. According to Article 70 of the Rules no name has priority outside its own rank. Article 71, Recommendation 71A suggests that in changing rank it is preferable to retain the original epithet unless it must be rejected under the rules. This particular choice of names seems to be in accordance with both articles, and keeps available the names now in usage, instead of either changing their application, or supplanting them with new names which would be permissible under the rules.

Selected specimens: ARKANSAS Marion Co.: Demaree 20645 (NY); ILLINOIS: Peoria Co.: McDonald Aug. 1903 (NY); Champaign Co.: Gleason Oct. 7, 1907 (DUKE); INDIANA: Lawrence Co.: Kriebel 1348 (DUKE); Iowa: Story Co.: Hayden 424 (GH); MISSOURI: Jackson Co.: Bush 12483A (NY) and 12483 (DUKE); NEBRASKA: Howard Co.: Bates 4910 (GH); New Jersey: Somerset Co.: Lighthipe Aug. 1, 1916 (TEX); TEXAS: Comal Co.: Lindheimer May 1847 (GH); Kerr Co.: Heller 1756 (NY, UC); Tarrant Co.: Ruth 746 (NY, PH); Travis Co.: Tharp May 6, 1931 (TEX).

9c. *P. virginiana* Miller, var. *texana* (Rydberg) Waterfall, comb. et stat. nov., based on *P. texana* Rydberg, Mem. Torr. Bot. Club 4: 339–340. 1896.

Plant usually several-branched from the base; herbage glabrous or nearly so; principal leaves ovate and usually entire; plant of the Gulf coast of Texas, apparently intergrading inland with contiguous varieties.

TYPE: The type is A. A. Heller 1507 NY; isotypes: ARIZ, GH, PH, UC.

This is primarily a taxon of the coastal area, but it extends inward through chaparral and other habitats nearly to central Texas, becoming more atypical as it does so. It usually flowers from March to June, but

flowering specimens have been seen that were collected in December and in August.

Selected from 35 sheets of 17 collections: TEXAS: Bexar Co.: Metz 73 (MICH., NY); Cameron Co.: Parks 17943 (GH); Gonzales Co.: Tharp 51-556 (TEX); LaSalle Co.: Tharp and Tyson 52-488 (OKLA., TEX); Nueces Co.: Tharp, Johnston and Webster 48-58 (TEX, ARK, OKLA.); San Saba Co.: Palmer 11841 (TEX); Travis Co.: Tharp and Scarbrough 51-399 (COLO, OKLA., TEX, UARK); Victoria Co.: Tharp 2516 (TEX); Washington Co.: Tharp July 9, 1929 (OKLA., TEX); Wilson Co.: Palmer 947 (GH, NY).

9d. *P. virginiana* Miller, var. *sonorae* (Torrey) Waterfall, comb. nov., based on *P. pumila* Nutt., var. *sonorae* Torr., Botany of the Mexican Boundary 153. 1859; *P. longifolia* Nutt., Trans. Am. Phil. Soc. (n.s.) 5: 193-194. 1836; *P. lanceolata* Michx., var. *laevigata* Gray, Proc. Am. Acad. Arts and Sciences 10: 68. 1875; *P. lanceolata* Michx., var. *longifolia* (Nutt.) Trelease, Rep. Ark. Geol. Surv. 4: 207. 1891; *P. rigida* Pollard and Ball, Proc. Biol. Soc. Wash. 13: 134-135. 1900.

Since, according to Article 70, "When the rank . . . of an infrageneric taxon is changed, the correct name or epithet is the earliest legitimate one available in the new rank," the well-known name *longifolia* must be replaced in the varietal status with the relatively unknown *sonorae*.

Plants usually single stemmed, often branching above; leaf blades usually lanceolate to lanceolate-linear, but rarely ovate, their margins entire to irregularly toothed; herbage sparsely covered with short antrorse hairs, which are more abundant on the younger parts, sometimes nearly glabrous; calyx often with ten lines of short antrorse hairs; anthers yellow. Sometimes this variety is difficult to separate from var. *subglabrata*. In such cases the bluish, or violet, anthers of the latter is considered a distinguishing characteristic since it occurs in a large population of the northeastern United States where the yellow-anthered var. *sonorae* is not found.

TYPE: *Geo. Thurber* 418, Fronteras, Sonora, Mexico, June 1851 in the Herbarium of the New York Botanical Garden. Two isotypes are in the Gray Herbarium.

Habitat, distribution and flowering time: This variety grows in prairies, plains, foothills, canyons, open woods, sandy areas and in various disturbed habitats. Its primary distribution is in the prairie region of central United States, but it extends into and west of the Rockies. It flowers in June, July and August in the northern part of its range, and from May through September in Texas and Arizona.

Four hundred sixty seven sheets of 385 collections have been studied. They were collected in Arizona, Arkansas, California (Trinity Co.), Colorado, Georgia (Whitfield Co.), Idaho, Illinois, Indiana, Iowa, Kansas, Nebraska, Nevada (Churchill and Storey Cos.), New Mexico, North Carolina, Oklahoma, Oregon (Malheur Co.), Pennsylvania (*Small*, 1889), South Dakota, Tennessee (Davidson Co.), Texas, Utah, Virginia (King George Co.), West Virginia (Mineral Co.), Wisconsin, and Wyoming (Park and Weston Cos.).

It is probable that the records from the far west represent introductions.
9e. *P. virginiana* Miller, var. *hispida* Waterfall, var. nov., foliis ovato-

lanceolatis vel lanceolatis, vel spathulato-lanceolatis, crassis, plus minusve hispidis.

This perennial rhizomatous variety has thick leaf blades varying from ovate-lanceolate to linear-lanceolate in shape. The herbage is sub-glabrous, but it has a varying amount of stiff, more or less divergent trichomes about 1 mm. long, at least on the flower buds or the margins of the leaves. It is found in sandy areas of the prairie and plains region. It has been passing as *P. lanceolata*, but that name was given to seemingly aberrant plants of the eastern United States which may very well be intergrades between *P. heterophylla* and *P. virginia*.

The TYPE is *Waterfall* 7308, sand dunes, 1 mile east of Mangum, Greer Co., Oklahoma, June 28, 1947, in the Herbarium of Oklahoma State University; isotypes (TEX, OKL).

It usually grows in sandy situations, but is found also on dry hilltops, edges of fields and other disturbed areas, primarily in Oklahoma, Kansas, Nebraska and eastern Colorado; flowering in May, June and July.

Selected from 212 sheets of 147 collections: COLORADO: Baca Co.: *Rogers* 6436 (COLO); Boulder Co.: *Ramaley* 11624 (COLO); Denver Co.: *Eastwood* 23 (COLO, GH, UC); El Paso Co.: *Williamson* July 10, 1901 (PH); Fremont Co.: *Brandegee* 392 (NY, PH, UC); Jefferson Co.: *Greene* 323 (GH); Larimer Co.: *Smith* July 15, 1944 (UC); Las Animas Co.: *Rogers* 6003 (COLO); Lincoln Co.: *Owenbey* 1318 (COLO, GH, NY, UC); Phillips Co.: *Weber* 5040 (COLO); Weld Co.: *Ramaley* 15138 (ARIZ, COLO, OKL, TEX, UC); Yuma Co.: *Harrington* 5036 (COLO); INDIANA: Lake Co.: *Bebb* 499 (OKL); Tippecanoe Co.: *Eh* June 10, 1942 (GH, NY, TEX, UC); KANSAS: Barton Co.: *Rydberg* and *Imler* 1330 (KANU, NY); Cheyenne Co.: *McGregor* 9433 (KANU); Clark Co.: *Rydberg* and *Imler* 768 (KANU); Clay Co.: *Kellerman* July 2, 1888 (GH); Comanche Co.: *Rydberg* and *Imler* 1109 (KANU, NY); Finney Co.: *Rydberg* and *Imler* 996 (KANU, NY); Grove Co.: *Hitchcock* 572 (GH); Hamilton Co.: *Wilson* and *Miller* (KANU); Meade Co.: *Horr* and *McGregor* 3841 (KANU); Reno Co.: *Rydberg* and *Imler* 563 (KANU, NY); Riley Co.: *Norton* 368 (GH, NY); Rooks Co.: *Horr* 5005 (KANU); Sedgwick Co.: *Coll. unknown* Aug. 20, 1933 (KANU); Wyandotte Co.: *Mackenzie* 1159 (NY); MINNESOTA: Isanti Co.: *Rosendahl* and *Butters* 5051 (GH); MISSOURI: Jackson Co.: *Bush* 4970 (GH, NY, OKL); Johnson Co.: *Stevens* 4166 (NY); Nebraska: Banner Co.: *Rydberg* 473 (NY); Cherry Co.: *Tolstead* 550 (GH); Custer Co.: *Bates* June 15, 1901 (GH); Hapeman June 7, 1928 (DUKE); Lincoln Co.: *Porter* 2059 (GH, OKL); NEW MEXICO: Santa Fe Co.: *Tracy* and *Evans* 110 (NY); OKLAHOMA: Beckham Co.: *Pennell* 10556 (NY, PH); Beaver Co.: *Goodman* 5332 (OKL, TEX); Blaine Co.: *Waterfall* 7070 (OKL, OKLA, TEX); Cleveland Co.: *Little* 396 (OKL); Custer Co.: *Mericle* 318, 328, 703, 1866 (OKL); Ellis Co.: *Waterfall* 11891 (OKLA); Garvin Co.: *Andrews* 97 (OKL); Grady Co.: *McFarland* 15 (OKL); Greer Co.: *Bull* 219 (OKL); Harper Co.: *Stevens* 3322 (GH, NY, OKL); Jackson Co.: *Stevens* 1176 (GH, OKL); Kay Co.: *Stevens* 1919 (GH); Kingfisher Co.: *Byers* 211 (OKLA); Logan Co.: *Goodman* 9126 (GH, OKL); Oklahoma Co.: *Waterfall* 2350 (GH, NY); Payne Co.: *Abernathy* 32 (OKLA); Pushmataha Co.: *Waterfall* 11397 (OKLA); Roger Mills Co.: *Smith* 607 (OKLA); Texas Co.: *Waterfall* 7961 (OKL, OKLA); Woods Co.: *Waterfall* 7857 (OKL, OKLA); Woodward Co.: *Nelson* and *Goodman* 5301 (OKL); South Dakota: Meyer Co.: *Wallace* (NY); TEXAS: Collingsworth Co.: *Cory* 16151 (GH); Hall Co.: *Reverchon* 4311 (GH); Hemphill Co.: *Cory* 16236 (GH); Wichita Co.: *Tharp* 535 (NY, TEX); UTAH: Sanpete Co.: *Ward* 676 (GH); WYOMING: Albany Co.: *Nelson* 7358 (GH, NY);

Converse Co.: Nelson 8366 (GH); Platte Co.: Porter 4894 (COLO, GH, OKL, PH, TEX, UC).

9f. **P. virginiana** Miller, var. **polyphylla** (Greene) Waterfall, comb. et stat. nov., based on *Physalis polyphylla* Greene, Pittonia 4: 150-151. 1900.

Plants simple or branched near the base, nearly glabrous, the few hairs short and antrorse; longer leaves mostly 3-5 cm. long, lanceolate or linear-lanceolate.

TYPE: C. F. Baker 576 Piedra, southern Colorado, July 12, 1899 (isotypes: GH, NY, UC).

The only other collection seen is Waterfall 11115, collected on a shale hillside, opening in pine forest 12 miles west of Chama, Rio Arrobo Co., New Mexico, Aug. 25, 1952. (OKLA).

9g. **P. virginiana** Miller, var. **campaniforma** Waterfall, var. nov., caulibus parvis, curtis retrorsum-pilosus; foliis ovatis; corollis maculatis; calyx campaniformis, ad basin 4-5 mm. latis, ad apices 1.5-2 cm. latis.

This variety is characterized by the combination of ovate leaves, short retrorse hairs and campanulate calyx, 4-5 mm. wide at its base, and 1.5-2 cm. wide at the tips of its divergent lobes.

TYPE: P. C. Standley 4556. Mouth of Indian Creek, altitude 8000 ft.; in Pecos National Forest, New Mexico, July 25, 1908. Two sheets are in the Herbarium of the New York Botanical Garden. At present this distinctive variety is known only from the type collection.

10. **Physalis hederaefolia** Gray, Proc. Amer. Acad. Arts and Sciences 10: 65. 1875.

Plants erect or spreading from a perennial base, simple or many-stemmed; herbage with a mixture of long jointed hairs and short trichomes, or with short hairs only, which may be viscid or not, glandular or not, antrorse or spreading; leaf blades subreniform to ovate, or rarely ovate-lanceolate; corollas 10-15 mm. long, yellow or yellowish green, usually darker on the base of the limb, but sometimes obscurely so; limb of the corolla often reflexed when fully open; anthers usually yellow, 1.5-4 mm. long; flowering calyx about one-half as long as the corolla, on peduncles usually 3-8 mm. long; fruiting calyx 2-3 cm. long and 1.5-2.5 cm. wide on peduncles 1-2 cm. long.

10a. **P. hederaefolia** Gray, var. **hederaefolia** *P. hederaefolia* Gray, var. *puberula* Gray, loc. cit. supra; *P. Palmeri* Gray, Synoptic Flora 2 (1): 235. 1888.

Herbage vestite with one or some combination of long jointed hairs, short divaricate or retrorse hairs, or glandular hairs; leaf blades subreniform to ovate; calyces at anthesis usually 3-4 mm. wide; anthers mostly 3-4 mm. long, yellow

TYPE: Charles Wright 528, in part, Turkey Creek, western Texas to El Paso, Oct. 1849 (GH). It has a few long hairs, a few short hairs and a few sessile, or subsessile spherical glands; the type of var. *puberula* has many short hairs on the stems, and short hairs and a few spherical sessile glands on the leaves.

Variety *hederaefolia* grows in desert plains, desert scrub, canyons, mountains and valleys, primarily in southwestern Texas, New Mexico and adjacent Arizona; it flowers in May, June and July, sometimes in August, September and October.

Selected from 243 sheets of 180 specimens: ARIZONA: Cochise Co.: *Harrison* 8259 (ARIZ); Coconino Co.: *Hanson* 133A (COLO, TEX); Gila Co.: *Gould* and *Hudson* 3742 (ARIZ, GH, UC); Pima Co.: *Gould* 3952 (ARIZ); Pima Co.: *Toumey* 404 (ARIZ); Yavapai Co.: *Wolf* 2311 (GH); CALIFORNIA: San Bernardino Co.: *Wolf* 10772 (UC); San Diego Co.: *Abrams* 3703 (GH); NEVADA: Clark Co.: *Clokey* 8107 (GH, NY); Lincoln Co.: *Ripley* and *Barney* 6405 (NY); NEW MEXICO: Bernalillo Co.: *Koelz* June 28, 1926 (MICH); Dona Ana Co.: *Wooton* 136 (NY); Grant Co.: *Greene* Sept. 31, 1880 (NY); Lincoln Co.: *Wooton* 634 (NY); San Miguel Co.: *Rose* and *Fitch* 17606 (NY); TEXAS: *Cory* 16628 (GH); Bandera Co.: *Palmer* 12253 (TEX); Brewster Co.: *Mueller* 8154 (GH, MICH, NY, TEX, UC); *Warnock* 341 (GH, NY, TEX); Burnet Co.: *Rogers*, *Albers* and *Barksdale* 6864 (OKLA, TEX); Cameron Co.: *Chandler* 7064 (GH, NY, UC); Culberson Co.: *Waterfall* 4059 (GH, NY); Duval Co.: *Croft* 11 (MICH, NY); El Paso Co.: *Warnock* 4100 (TEX); Gonzales Co.: *Smith* and *LeSueur* 42-42 (GH, TEX); Grimes Co.: *Tharp* April 11, 1936 (TEX); Hidalgo Co.: *LeSueur* 442 (TEX); Hudspeth Co.: *Waterfall* 4875 (GH, NY); Jeff Davis Co.: *Palmer* 31935 (TEX); Kenedy Co.: *Cory* 28408 (GH); Leon Co.: *Cory* 21810 (GH); Mason Co.: *Whitehouse* Sept. 1, 1929 (TEX); McLennan Co.: *Smith* 620 (TEX); Maverick Co.: *Pringle* 8324 (GH, NY, UC); Pecos Co.: *Tharp* 256 (OKL, UC); Presidio Co.: *Hinckley* 2753 (GH); Real Co.: *Cory* 42778 (GH); Reeves Co.: *Tracy* and *Earle* 126 (GH, NY, TEX); Smith Co.: *Cory* 25881 (GH); Taylor Co.: *Cory* 7393 (MICH, UC); Terrell Co.: *Webster* 190 (TEX); Tom Green Co.: *Reverchon* 3922 (GH); Travis Co.: *Tharp* Aug. 18, 1941 (GH, TEX); Upton Co.: *Cory* 53482 (GH); Webb Co.: *Mackenzie* 86 (NY); UTAH: Kane Co.: *Boyle* 208 (UC); Millard Co.: *Garrett* 2969 (NY).

10b. *P. hederaceaefolia* Gray, var. *comata* (Rydberg) Waterfall, RHODORA 52: 171. 1950; *P. comata* Rydb., Bull. Torr. Bot. Club 22: 306. 1895; including *P. rotundata* Rydb., Mem. Torr. Bot. Club 4: 352. 1896.

Herbage with long jointed hairs more or less abundantly mixed with shorter hairs, which may, or may not, be viscid or glandular; flowering calyx 8-11 mm. wide; leaf blades ovate to rotund, toothed to nearly entire.

TYPE: *P. A.* Rydberg 269, under the cliffs, south side of Scott's Bluff, Nebraska, July 20, 1891, in the Herbarium of the New York Botanical Garden.

Variety *comata* is found on plains, mountains slopes, dry hills, gravel banks and sandhills, principally in western Nebraska, western Kansas and eastern Colorado; it usually flowers in June, July, August and September.

Selected from 80 sheets of 63 collections: COLORADO: Bent Co.: *Osterhout* 4118 (NY); Boulder Co.: *Ewan* 12258 (UC); Cheyenne Co.: *Owensby* 1357 (COLO, GH, NY); Denver Co.: *Eastwood* Sept. 10, 1910 (GH, UC); El Paso Co.: *Ehlers* 7764 (ARIZ, GH); Fremont Co.: *Ewan* 14248 (COLO); Larimer Co.: *Nelson* Aug. 31, 1900 (NY); Las Animas Co.: *Rogers* 4843 (COLO); Weld Co.: *Osterhout* 2309 (NY); KANSAS: Barber Co.: *Rydberg* and *Imler* July 5, 1929 (NY); Cheyenne Co.: *McGregor* 9425 (KANU); Ellis Co.: *Rydberg* and *Imler* 1228 (KANU, NY); Finney Co.: *Wilson* and *Miller* July 22, 1912 (KANU); Kiowa Co.: *Hitchcock* 774 (GH, NY); Osborne Co.: *Shear* 221 (GH, NY); Riley Co.: *Gates* 14637 (MICH); Rooks Co.: *Bates* 4563 (GH); NEBRASKA: Adams Co.: *Bates* 4607 (GH); *Rydberg* Aug 8, 1891 (NY); Buffalo Co.: *Bates* 4903 (GH); Custer Co.: *Bates* 2403 (GH); Garfield Co.: *Bates* 4634 (NY); Lincoln Co.: *Rydberg* Sept, 1895 (UC); Webster Co.: *Bates* July 3, 1907 (NY); NEW MEXICO: Lincoln Co.: *Skehan* July 7, 1898 (GH, NY, UC); OKLAHOMA: Cimarron Co.: *Waterfall* 7902, 9122, 9240 (OKL, OKLA); Texas Co.: *Waterfall* 7867 (OKL, OKLA, TEX); Woods Co.: *Ward* 54 (NY); SOUTH DAKOTA: Lawrence Co.: *Bennett* 3259 (UARK).

10c. *P. hederaefolia* Gray, var. *cordifolia* (Gray) Waterfall, comb. nov., based on *P. Fendleri* Gray, var. *cordifolia* Gray, Synop. Flora N. Amer. 2(1): 395. 1878. *P. Fendleri* Gray, Proc. Amer. Acad. Arts and Sciences 10: 66. 1875.

Indument of short reflexed hairs with many to few short, somewhat flattened branched hairs, which are sometimes present only on the calyx; leaf blades ovate to ovate-lanceolate (2) 3–6 cm. long and 1–3 cm. wide, from (1.2) 1.4–2.5 times longer than wide.

TYPE: The type of *P. Fendleri* is *Fendler 683*, New Mexico (GH). That of var. *cordifolia* is *Palmer 363*, St. George, southern Utah (GH).

This taxon grows in mountains, canyons, mesas, plains, in juniper-pinen pine areas, and in disturbed habitats, principally in southwestern Texas; it flowers mostly in July, August and September.

Selected from 196 sheets of 146 collections: ARIZONA: Apache Co.: *Goodman* and *Payson 3167* (GH, NY); Cochise Co.: *Blumer 2104* (ARIZ, GH, NY); Coconino Co.: *Thornber 2088* (ARIZ); Gila Co.: *Parker, McClintock* and *Robbins 6125* (ARIZ); Maricopa Co.: *Rusby 775* (MICH, NY); Mohave Co.: *Kearney* and *Peebles 12761* (ARIZ); Navajo Co.: *Jones 1109* (ARIZ); Pima Co.: *Parker, McClintock* and *Haskell 5885* (ARIZ, UC); Santa Cruz Co.: *Peebles* and *Loomis 7019* (ARIZ); Yavapai Co.: *Kearney* and *Peebles 9719* (ARIZ); CALIFORNIA: San Bernardino Co.: *Wolf 10722* (NY, UC); San Diego Co.: *Palmer 1875* (GH); COLORADO: Archuleta Co.: *Weber* and *Livingston 6254* (COLO); El Paso Co.: *McCosh* and *Greene 1877* (NY); Fremont Co.: *Waterfall 11503* (OKLA, TEX); Huerfano Co.: *Ramaley 16236* (COLO); La Plata Co.: *Jones 503* (MICH); Las Animas Co.: *Rogers 5416* (COLO); Mesa Co.: *Rollins 1915* (GH, NY); Montezuma Co.: *Baker, Earle* and *Tracy 823* (NY); Montrose Co.: *Payson 3927* (GH); Otero Co.: *Paull 87* (COLO); Pueblo Co.: *Pammel Aug. 24, 1913* (GH, TEX); NEVADA: Clark Co.: *Train 2003* (ARIZ); *Clokey 8204* (ARIZ, DUKE, NY, OKL, OKLA, TEX); NEW MEXICO: Colfax Co.: *Standley 14012* (NY); Dona Ana Co.: *Wooton* and *Standley 3157* (ARIZ, NY); Grant Co.: *Blumer 49* (GH, NY); Luna Co.: *Shreve 8343* (ARIZ); Otero Co.: *Schulz 297* (GH); San Miguel Co.: *Standley 4945* (GH, NY); Santa Fe Co.: *Robbins 8244* (COLO); Sierra Co.: *Metcalfe 945* (GH, NY); Taos Co.: *Wooton 2693* (NY); Torrance Co.: *Parker* and *McClintock 6526* (ARIZ); Valencia Co.: *Vogt 27* (ARIZ); Oklahoma: Cimarron Co.: *Waterfall 7915* (OKL, OKLA); TEXAS: Brewster Co.: *Marsh 261* (GH); El Paso Co.: *Lee, Berkman* and *Tharp 46192* (TEX); Hudspeth Co.: *Waterfall 6694* (GH); Jeff Davis Co.: *Hinckley 574* (NY); UTAH: Piute Co.: *Tidstrom 2942* (MICH); San Juan Co.: *Rydberg* and *Garrett 9390* (NY); Washington Co.: *Gould 2028* (ARIZ, COLO, GH, NY).

11. *Physalis caudella* Standley, Field Mus. Publ. Bot. 17: 273. 1937.

Plants simple or branched, apparently from a deep rhizome which is not collected; indument usually villous, of long jointed hairs (1) 2–3 mm. long, dense or sparse, or of long and short hairs intermixed in varying proportions; leaf blades 4–7 cm. long and 1.5–4 cm. wide, usually lanceolate, rarely ovate-lanceolate or linear-lanceolate, on petioles 0.5–2 cm. long (this amount of variation in length of petioles may be found in the same plant, with the longer petioles below and the shorter ones above); margins of the leaf blades entire to irregularly undulate to saliently few-toothed; corollas 14–18 mm. long, yellow, with prominent deep reddish-blue or purplish spots on the limb; anthers blue or blue-green, about 3 mm. long, on slender filaments much

narrower than the anthers; calyx 7–10 mm. long, its lobes 3–8 mm. long; flowering peduncles usually about 5 mm. long, sometimes as much as 8 mm. long; fruiting calyx (2.5) 3–5 cm. long and (2) 2.5–3 cm. wide, with calyx lobes (6) 10–15 (17) mm. long.

TYPE: *Howard Scott Gentry 2710*, on oak-pine slope, 2,160 meters elevation, Cajurichi, Rio Mayo, Chihuahua, Mexico, Sept. 13, 1936 (F). An isotype is at UC. The isotype has lobes of the flowering calyx 3–8 mm. long, and a calyx cup only about 2 mm. long; the fruiting calyx also has lobes at the extreme limit of length, being 14–17 mm. long. One of the Arizona specimens approaches the type, having a flowering calyx with lobes 7 mm. long and a calyx tube 3 mm. long. However most of them have calyx lobes somewhat shorter than the calyx tube; the lobes of the fruiting calyx in the Arizona material are usually 10–15 mm. long, rarely as short as 6 mm.

Habitat, range and flowering time: Growing in canyons, pine woods and oak woods in the mountains of southern Arizona (with one collection from southwestern New Mexico) and adjacent Sonora and Chihuahua; flowering in June, July and August.

Selected from 31 sheets of 19 collections: Arizona: Cochise Co.: Benson 10448 (ARIZ, NY, UC); Gooding 843 (ARIZ, GH, NY); Pima Co.: Kearney and Peebles 10504 (ARIZ, UC); Santa Cruz Co.: Parker 7683 (ARIZ, COLO, NY, UC); NEW MEXICO: Socorro Co.: Wooton Aug. 6, 1900 (NY).

12. *Physalis crassifolia* Bentham, Botany of the Voyage of the Sulphur 40. 1844.

Stems usually several from a ligneous base, each stem branched, sometimes several times; herbage minutely puberulent, sometimes slightly glandular; principal leaf blades (1.5) 2–3 (5) cm. long, and (1.5) 2–2.5 (3.5) cm. wide, usually broadly ovate; leaf margins entire to sinuately or repandly few-toothed to dentate; petioles two-thirds the length of the blade to equaling it; corolla yellow, sometimes becoming bluish in age, or when dried and pressed, 10–15 mm. long, its limb reflexed when fully open; anthers yellow, 2.5–3 mm. long; filaments having a few long hairs growing on them; calyx at anthesis usually 3–6 mm. long on peduncles 5–10 times their length; fruiting calyx usually 2–3 cm. long and 1.5–2 cm. wide.

12a. *P. crassifolia* Bentham, var. *crassifolia*. *P. cardiophylla* Torrey, Bot. Mex. Bound. 153. 1859; *P. crassifolia* var. *cardiophylla* (Torr.) Gray, Synoptic Flora 2(1): 235. 1878; *P. muriculata* Greene, Bull. Calif. Acad. 1: 209. 1885.

Leaves thick, entire to sinuately or repandly few-toothed; flowering calyx usually 4–6 mm. long on peduncles 6–7 times their length; corollas yellow, sometimes with brownish centers.

TYPE: Bay of Magdalena, Lower California, Mexico; not seen.

Variety *crassifolia* grows on deserts, canyon floors, rocky hillsides, and mountains, principally in Arizona, and California; it flowers from March through October.

Selected from 185 sheets of 157 collections: ARIZONA: Cochise Co.: Blumer 90 (ARIZ); Mohave Co.: Harrison, Kearney and Fulton 7549 (ARIZ); Pima Co.: Harrison and Kearney 7238 (NY); Pinal Co.: Gillespie 8919 (NY, UC); Yavapai

Co.: *Peebles, Harrison* and *Kearney* 7431 (NY); Yuma Co.: *Benson* 10807 (ARIZ); CALIFORNIA: Imperial Co.: *Rose* 36330 (OKL, MICH); Inyo Co.: *Clokey* and *Templeton* 5776 (NY, UC); Kern Co.: *Munz, Johnston* and *Harwood* 4034 (NY); Riverside Co.: *Clokey* 6881 (NY, UC); *Mason* 4185 (GH, UC), *Rose* 36001 (GH, UC); San Bernardino Co.: *Munz* 11720 (ARIZ, COLO, NY); San Diego Co.: *Abrams* 3160 (GH, NY); NEVADA: Clark Co.: *Clokey* 8577 (COLO, NY, UC); *Clover* 8235 (MICH); Lincoln Co.: *Kennedy* and *Gooding* 10 (ARIZ, NY, UC).

12b. *P. crassifolia* Bentham, var. *versicolor* (Rydberg) Waterfall, comb. et stat. nov., based on *P. versicolor* Rydb. Bull. Torr. Bot. Club 22: 307. 1895; *P. genucaulis* Aven Nelson, Bot. Gaz. 47: 430. 1909.

Leaves thinner, usually dentate, but sometimes nearly entire; calyx usually 3-4 mm. long on peduncles 5-10 times their length; corolla yellow, usually some, or all, of them turning bluish in drying.

TYPE: Rydberg selected no type, therefore *Edward Palmer* 622, collected at Guaymas, Mexico in 1887 is selected as the LECTOTYPE (NY); isolectotype (GH).

Its habitat, distribution and flowering time are apparently similar to the above, but it is not so widespread.

Selected from 71 sheets of 55 collections: ARIZONA: Gila Co.: *King* and *Belden* 2429 (ARIZ); Mohave Co.: (?) *Clover* 6009 (ARIZ); Pima Co.: *Toumey* June 1, 1896 (GH, NY), *Gould* and *Macbride* 4128 (ARIZ, GH, NY, UC); Pinal Co.: *Thornber* 5517 (ARIZ, NY); Yuma Co.: *Parker, Parker, Wright* and *Lowe* 7816 (COLO, NY, UC); CALIFORNIA: Imperial Co.: *Wiggins* 9606 (GH, UC); Riverside Co.: *Wiggins* 9673 (GH, NY, UC); Nevada: Clarke Co.: *Train* 1366 (NY, UC).

13. *Physalis ixocarpa* Brotero ex Hornemann, Hortus Regius Botanicus Hafniensis, Supplement 26. 1819; *P. aquata* Jacq. f. ex Nees, Linnaea 6: 470. 1831.

Annual, 15-60 cm. tall, branched, glabrous to rather sparsely vestite with short appressed hairs; leaf blades 2-7 cm. long, ovate to ovate-lanceolate; margins of the leaves dentate to sinuate-dentate to entire, on petioles about one-half as long as the blade to equaling it in length; corolla 7-15 mm. long, with 5 bluish-tinged dark spots on its limb which is recurved when fully open; anthers blue, about 3 mm. long, strongly twisted after dehiscence; flowering peduncles 3-5 mm. long; fruiting calyx usually 2-2.5 (3) cm. long, nearly globose, often well-filled with the fruit; fruiting peduncles usually 3-8 mm. long.

Fruiting material may often resemble *P. virginiana* var. *subglabrata*. It can be distinguished by its shorter peduncles.

TYPE: None was selected by Hornemann, and no material was cited. Presumably a neotype should be selected, probably from Mexican collections since the species seems to be native there. However the author prefers to defer this action until a more detailed study of the species from that area may be accomplished. The concept of the species is based upon the material cited later, which seems to be conspecific with Mexican material seen.

This species is cultivated and escapes; it flowers through much of its growing season.

Selected from 95 sheets of 81 collections: CANADA: Ottawa, *Marie-Victorin*, et al. 43923 (GH); UNITED STATES: CALIFORNIA: Butte Co.: *Yates* 6127

(uc); Fresno Co.: *Bacigalupi*, *Ferris* and *Wiggins* 2491 (GH, NY, uc); Los Angeles Co.: *Fosberg* 53036 (GH, NY); Riverside Co.: *Conger* Oct. 1909 (uc); San Bernardino Co.: *Parish* Sept. 1888 (uc); San Luis Obispo Co.: *Miossi* Aug. 5, 1840 (uc); Santa Barbara Co.: *Bingham* 29 (NY); Ventura Co.: *Pollard* Oct. 27, 1945 (COLO); DELAWARE: New Castle Co.: *Commons* Nov. 2, 1898 (GH); Sussex Co.: *Churchill* Sept. 11, 1908; Illinois: Adams Co.: *Seymour* Aug. 1878 (DUKE); DuPage Co.: *Moffett* 3197 (GH, OKLA); Fulton Co.: *Vasey* 1862 (GH); MARYLAND: *McVaugh* 134543, cult., originally from Mexico (MICH); MASSACHUSETTS: Middlesex Co.: *Deane* Sept. 24, 1884 (NEBC); Norfolk Co.: *Fernald* Sept. 26, 1908 (GH); MICHIGAN: Emmet Co.: *Hoover* 1943, seeds from the Orange Free State (DUKE, TEX, uc); MINNESOTA: Herb, *Canby* Sept. 1868 (NY); NEW JERSEY: Hunterdon Co.: *Dodge* July 18, 1899 (MICH); NEW MEXICO: Rio Arriba Co.: *Wooton* 2697 (NY); Santa Fe Co.: *Fendler* 680 (GH); NEW YORK: Ontario Co.: coll. unknown Aug. 2, 1887, raised from seeds from Palmer from Mexico (GH); Tompkins Co.: *Hoisington* 340, cultivated (OKLA); OREGON: Multnomah Co.: *Nelson* 3325 (GH); PENNSYLVANIA: *Fretz* 1881 (uc); Philadelphia Co.: *Parker* Sept. 9, 1874 (NY); TEXAS: Bexar Co.: *Jermy* 1904 (NY); Brewster Co.: *Marsh* 163 (GH); Crockett Co.: *Cory* 29703 (GH); Refugio Co.: *Tharp* Sept. 7, 1929 (MICH); Webb Co.: *Mackenzie* 85 (NY); VERMONT: Chittenden Co.: *Flynn* 4 (GH); VIRGINIA: Clarke Co.: *Young* 485, raised in experimental plots (TEX); WASHINGTON: Klakitat Co.: *Suksdorf* 2284 (GH, uc); Washington D. C.: *Steele* Sept. 20, 1899 (DUKE); WEST VIRGINIA: Rawleigh Co.: *Tosh* 650 (uc).

14. *Physalis Wrightii* Gray, Proc. Amer. Acad. Arts and Sciences 10: 63. 1875.

Annual 30–90 cm. tall, nearly glabrous, the few hairs short, stiff and appressed; leaf blades ovate-lanceolate to linear-lanceolate, the principal ones usually 4–12 centimeters long on petioles 1.5–7 cm. long; leaf margins usually irregularly and often coarsely dentate, sometimes regularly and saliently dentate; corolla a light yellow color, sometimes with a greenish tinge, rotate with very little tube, 15–23 mm. wide when fully open, with five hairy pads on its limb near the base, alternating with the stamens; anthers (2.8)3 (3.8) mm. long, yellow with a blue or blue-green tinge; filaments slender, somewhat exceeding the anthers in length; flowering calyx usually 4–5 mm. long on peduncles 5–12 times its length; fruiting calyx usually 2–2.5 cm. long and 1.7–2 cm. wide, on peduncles usually 2.5–6 cm. long, sometimes nearly filled by the fruit.

TYPE: *Charles Wright* 1602, prairies along the San Pedro River, southwestern Texas, 1851–52 (GH); isotype (NY); no other collections have been seen from Texas.

Habitat, distribution and flowering time: Growing in deserts and mountains, but particularly in fields and other disturbed habitats, primarily in Arizona and California; flowering from July to November.

Selected from 46 sheets of collections: ARIZONA: Cochise Co.: *Griffiths* 1579 (ARIZ, NY); Gila Co.: *Collom* Sept. 15, 1934 (MICH); Graham Co.: *Richardson* 437 (ARIZ); Maricopa Co.: *Wiggins* 3860 (MICH); Navajo Co.: *Zuch* 49 (ARIZ); Pima Co.: *Pringle* Aug. 1, 1894 (GH, NY); *Gould* 3938 (ARIZ, TEX, uc); Pinal Co.: *Arnold* and *Darrow* Sept. 13, 1936 (GH, uc); Yuma Co.: *Thornber* Sept. 24, 1912 (ARIZ); CALIFORNIA: Imperial Co.: *Munz* 11523 (NY); Kern Co.: *Yates* 6839 (uc); Los Angeles Co.: *Wheeler* 964 (uc); San Diego Co.: *Brandegee* July 1895 (uc); TEXAS: *Wright* 1602. (GH, NY).

15. **Physalis angulata** Linnaeus, Species Plantarum 1: 183. 1753;
other synonymy under the varieties.

Annual, 15–90 cm. tall, glabrous, or with a few short appressed hairs especially on the younger parts; blades of principal leaves usually 4–10 cm. long, ovate to lanceolate, or sometimes linear-lanceolate; margins of the leaves irregularly and sometimes coarsely or saliently toothed, or entire, on petioles 1–4 cm. long; corolla yellowish, not dark spotted, usually 4–10 mm. long; anthers usually 1–2.3 mm. long, bluish, on slender filaments; flowering calyx usually 3–5 mm. long with calyx lobes 1–2.5 mm. long; flowering peduncles 5–40 mm. long; fruiting calyx usually 2–3 cm. long and 1.5–2.5 cm. wide on peduncles 10–40 mm. long.

15a. **P. angulata** L., var. **angulata**. *P. Linkiana* Nees, Linnaea 6: 471–472. 1831; *P. angulata* L., var. *Linkiana* (Nees) Gray, Proc. Amer. Acad. Arts and Sciences 10: 64. 1875.

Leaves ovate to ovate-lanceolate; corolla usually 6–10 mm. long; flowering calyx usually 4–5 mm. long with calyx lobes 2–2.5 mm. long; flowering peduncles usually 5–15 mm. long; fruiting calyx on peduncles usually 20–30 mm. long, shorter than to equalling the length of the fruiting calyx.

Variety *angulata* grows in open woods, pastures, ditches, fields, and various disturbed habitats in the extreme eastern states, and in the southeastern states as far west as eastern Oklahoma and Texas; it flowers from May to September.

Selected from 104 sheets of 77 collections: ALABAMA: Coosa Co.: *Pollard* and *Ball* 263 (GH, NY); Lee Co.: *Earle* and *Baker* Aug. 11, 1897 (NY); Tuscaloosa Co.: *Pollard* and *Mazon* 330 (MICH, NY); ARKANSAS: Arkansas Co.: *Moore* 32748 (OKLA, UARK); Ashley Co.: *Demaree* 16362 (NY); Chicot Co.: *Demaree* 18567 (ARIZ, NY); Hempstead Co.: *Buckholz* 388 (UARK); Jefferson Co.: *Demaree* 13987 (NY); Pulaski Co.: *Merrill* 672 (UARK); CONNECTICUT: Hartford Co.: *Bissell* Aug. 19, 1904 (GH); DELAWARE: *Commons* Aug. 15, 1877; FLORIDA: Collier Co.: *Moldenke* 5761 (NY); Columbia Co.: *Straub* 36 (GH); Duval Co.: *Curtiss* 5737 (GH, NY, UC); Gadsden Co.: *Berg* (NY); Gulf Co.: *Chapman* 4345 (GH, NY); Hillsborough Co.: *Deam* 2746 (GH); Lake Co.: *Nash* 1052 (GH, MICH, UC); Lee Co.: *Hitchcock* 238 (GH, NY); Leon Co.: *Godfrey* 52385 (DUKE); Pinellas Co.: *Deam* 2905 (GH); Polk Co.: *McFarlin* 6569 (MICH); Volusia Co.: *Hood* 9 (GH); GEORGIA: Decatur Co.: *Thorne* 4629 (GH); De Kalb Co.: *Small* Sept. 11, 1894 (NY); McDuffie Co.: *Bartlett* 1662 (MICH); LOUISIANA: Baton Rouge Parish: *Chamblis* 17 (NY); *Correll* 9567 (DUKE, GH, NY); Tangipahoa Parish: *Correll* 9240 (DUKE); MISSISSIPPI: Harrison Co.: *Tracy* 6476 (GH, NY); Jackson Co.: *Pollard* 1123 (GH, NY); NEW JERSEY: Brunswick Co.: *Godfrey* 10083 (TEX); Camden Co.: *Beringer* Sept. 1891 (MICH); NORTH CAROLINA: Moore Co.: *Oosting* 34777 (DUKE, PH); New Hanover Co.: *Williamson* Sept. 1, 1900 (NY, PH); Wilson Co.: *Randolph* and *Randolph* July 7, 1922 (GH); OKLAHOMA: Delaware Co.: *Wallis* 2728 (OKLA); Oklahoma Co.: *Waterfall* 2349 (OKL); Pottawatomie Co.: *Barkley* 395 (OKL); SOUTH CAROLINA: Charleston Co.: *Moldenke* 5196 (NY); in cultis *Curtis* (GH); TEXAS: Angelina Co.: *Cory* 10665 (GH); Brazos Co.: *Parks* Dec. 1, 1946 (TEX); Gonzales Co.: *Tharp* Nov. 23, 1935 (MICH); Harris Co.: *Boon* 481 (TEX); Houston Co.: *Cory* 26121 (GH); Jefferson Co.: *Tharp* Sept. 9, 1937 (TEX); Wood Co.: *Cory* 57671 (COLO); VIRGINIA: Princess Anne Co.: *Fernald* and *Long* 10881 (GH); Southampton Co.: *Fernald* and *Long* 13742 (GH).

15b. *P. angulata* L., var. *pendula* (Rydberg) Waterfall, comb. et stat. nov., based on *P. pendula* Rydb. in Small, Flora of the Southeastern United States 983. 1903.

Similar to var. *angulata*, but leaves sometimes narrower; flowering calyx usually 3 mm. long, sometimes 4 mm. long; with calyx lobes about 1 mm. long; flowering peduncles usually 15–40 mm. long; fruiting peduncles usually 20–40 mm. long, equalling the fruiting calyx (which is usually 20–25 mm. long) to three times its length.

TYPE: In describing this species, Rydberg did not select a type, stating that it was the taxon that he had originally called *P. lanceifolia*, or at least the part of it occurring from Illinois to Texas. He cited several collections in his treatment of the genus (1896), and from among these F. L. Harvey 65 "central and southern Arkansas" (UARK) is selected as LECTOTYPE.

This variety grows in river valleys, bottom woods, fields and various disturbed sites, primarily in Oklahoma and Texas, but extending north to Illinois; it flowers from June through September.

Selected from 125 sheets of 104 collections: ARKANSAS: Conway Co.: Moore 420449 (UARK); Garland Co.: Demaree 20471 (NY, UC); Harvey 65 (MICH); Little River Co.: Moore 510682 (UARK); Prairie Co.: Demaree 15498 (NY); Pulaski Co.: Merrill 725 (UARK); ILLINOIS: Alexander Co.: Palmer 16628 (PH); Cook Co.: Umbach Aug. 3, 1897 (MICH, NY, PH); St. Claire Co.: Eggert Sept. 16, 1893 (GH); Union Co.: Vasey 1862 (GH); Vasey (NY); KANSAS: Douglas Co.: McGregor 607 (KANU); Geary Co.: Hitchcock 775 (GH, NY); Linn Co.: Rydberg and Imler 77 (NY); Miami Co.: McGregor 11048 (KANU); Sedgwick Co.: Horr 6191.1 (KANU); LOUISIANA: Hale (GH); MASSACHUSETTS: Middlesex Co.: Perkins Oct. 22, 1880 (NY); MISSOURI: Jackson Co.: Mackenzie May 10, 1896 (NY); Jasper Co.: Palmer 3093 (NY); St. Louis Co.: Eggert Sept. 7, 1887 (PH, UC); Engelmann 324 (GH); OKLAHOMA: Alfalfa Co.: Waterfall 9970 (OKLA); Blaine Co.: Waterfall 2387 (OKL, UC); Cherokee Co.: Wallin 1468, 1891 (OKLA); Creek Co.: Bush 397 (GH); Custer Co.: Palmer 12555 (TEX, UC); Garvin Co.: Andrews 133 (OKL); Logan Co.: Smith 889 (OKL); Murray Co.: Robbins 2729 (OKL); Muskogee Co.: Little 188 (OKL); Oklahoma Co.: Waterfall 2091 (OKLA, GH); Osage Co.: Stevens 2115 (GH, NY, OKL, OKLA); Payne Co.: Coryell 388, 596 (OKLA); Pittsburgh Co.: McClary 66 (OKL); Pontotoc Co.: McCoy 852, 1287, 1915 (OKLA); Pottawatomie Co.: Van Vleet July 12, 1905 (OKL); TEXAS: Bexar Co.: Metz 64 (NY, UC); Bowie Co.: Plank May 9, 1891 (NY); Brazos Co.: Reeves 62 (GH); Calhoun Co.: Gentry 49 (TEX, LIL); Colorado Co.: Bush 333 (GH, NY); Dallas Co.: Hall 504 (GH, NY); DeWitt Co.: Riedel Aug. 3, 1941 (TEX); Harris Co.: Boon June 22, 1943 (TEX); Jackson Co.: Tharp Aug. 8, 1941 (TEX); Lamar Co.: Strandman 10 (TEX); McLennan Co.: York 46232 (OKL, TEX); Refugio Co.: Tharp Dec. 4, 1928 (TEX); San Patricio Co.: Cory 45389 (GH); Tarrant Co.: Ruth 1242 (NY); Titus Co.: Jones 10 (TEX); Travis Co.: Tharp 1717 (TEX); Washington Co.: Brackett July 15, 1938 (GH, TEX).

15c. *P. angulata* L., var. *lanceifolia* (Nees) Waterfall, comb. et stat. nov., based on *P. lanceifolia* Nees, Linnaea 6: 473. 1831.

Similar to var. *pendula*, but leaves lanceolate to linear-lanceolate, and corolla usually only 4–5 mm. long; anthers often only 1–1.5 mm. long.

TYPE: No collections were cited by Nees who said "Habitat in Peruvia

(Ruiz et Pavon); in Mexico (Herb. Hort. Reg. Ber.)". A Neotype should be selected, but preferably after a study of Peruvian and Mexican material. Specimens cited below appear to be similar to a number of Mexican collections seen by the author.

Variety *lanceifolia* grows in wet areas, river valleys, fields and other disturbed habitats in California, Arizona, New Mexico and to a lesser extent in Texas and southern Oklahoma, often being atypical in the latter two states, probably due to gene interchange with var. *pendula*; a few Florida collections are also referred here; it flowers usually in June to September, or as late as November in the warmer parts of its range.

Selected from 64 sheets of 41 collections: ARIZONA: Cochise Co.: *Thornber* 2627 (GH), put here because the anthers are only about 1 mm. long, even though the leaves are broad; Pima Co.: *Pringle* Aug. 5, and Sept. 5, 1884 (NY, PH, UC); Pinal Co.: *Kearney* 15067 (ARIZ); Yuma Co.: *Schott* 2 (NY); CALIFORNIA: Butte Co.: *Heller* 13355 (GH); Fresno Co.: *Bacigalupi*, *Ferris* and *Wiggins* 2488 (GH, NY, UC); Imperial Co.: *Parish* 8337 (GH); Los Angeles Co.: *Wheeler* 965 (UC); Merced Co.: *Hoover* 1599 (UC); San Diego Co.: *Spencer* 1014 (GH); Stanislaus Co.: *Hoover* 2442 (UC); Tulare Co.: *Michener* and *Bioletti* 1893 (NY); FLORIDA: Dade Co.: *Small* and *Carter* 649 (NY, PH); Kevy Co.: *Small*, *Small* and *DeWinckeler* 10036 (NY); Monroe Co.: *Eyles* 8213 (GH, OKL); NEW MEXICO: Dona Ana Co.: *Archer* 489 (MICH); *Kearney* and *Peebles* 15073 (ARIZ); OKLAHOMA: *McCurtaun* Co.: *Waterfall* 7604 (OKL, OKLA); Oklahoma Co.: *Waterfall* 2893, near var. *pendula* (OKL); *Payne* Co.: *James* 37 (OKLA); TEXAS: *Brewster* Co.: *Cory* 31275 (GH); *Cameron* Co.: *Rumyon* 4243 (TEX); Llano Co.: *Bray* 10 (NY); *Presidio* Co.: *Warnock* T164 (GH, TEX); *Refugio* Co.: *Tharp* Sept. 7, 1929 (TEX); Travis Co.: *Tharp*, *Warnock* and *Barkley* Nov. 31, 1945, atypical material, perhaps intermediate with var. *pendula* (COLO, DUKE, GH, NY, OKL, OKLA, UARK, UC).

16. *Physalis pubescens* Linnaeus, Species Plantarum 1: 183. 1753.
Synonymy listed under the varieties.

Plants annual, 15–60 cm. tall, villous or viscid-villous vestite, sometimes with granular glands, sometimes glabrate; blades of principal leaves usually 3–10 cm. long, narrowly to broadly ovate, on petioles half as long to about equal them in length; margins of the leaves toothed to entire; corolla 6–10 mm. long, yellow with 5 prominent dark spots on the limb near its base; anthers 1.5–2 (2.4) mm. long, blue; flowering calyx 4–7 mm. long, its lobes 2–4 mm. long; flowering peduncles 3–12 mm. long; fruiting calyx 2–4 cm. long and 1.5–2.5 cm. wide, 5 angled, on peduncles 5–20 mm. long.

16a. *P. pubescens* L., var. *pubescens*. *P. turbinata* Medicus, Academia Theodora-palatina 4: 188–192. 1780; *P. barbadensis* Jacquin, Miscellanea Austriaca Sive Plantarum Selectarum 360. 1781; *P. obscura*, var. *viscido-pubescent* Michx., Flora Boreali-Americana 1: 149. 1803; *Alicabon barbadense* (Jacq.) Rafinesque, Sylva Telluriana 56–57. 1838; *P. viscido-pubescent* (Michx.) Dunal, in DeCandolle's Prodromus 13(1): 442. 1852; *P. floridana* Rydberg, in Small, Flora of the Southeastern United States 983. 1903.

Plants more or less villous; leaf blades usually with 5–8 teeth on each side, usually not translucent; flowering peduncles 3–7 mm. long; fruiting calyces 2–3 cm. long on peduncles usually 5–9 mm. long.

TYPE: "In India utraque." A photograph of the type is in the Arnold Arboretum's collection of photographs of specimens in the Linnaean Herbarium, London.

Variety *pubescens* grows in swamps, margins of lakes, sand dunes, brush, fields and other disturbed habitats, primarily from Florida to Texas in our area; it flowers from May through November. It is a widespread pantropical taxon.

Selected from 81 sheets of collections: FLORIDA: Broward Co.: *Moldenke* 480 (NY); Dade Co.: *Small* and *Small* 4632 (DUKE, NY); Franklin Co.: *Chapman* 3055b (GH, NY); Highlands Co.: *Moldenke* 5417 (NY); Hillsboro Co.: *Churchill* March 28, 1936 (GH); Lake Co.: *Nash* 1251 (GH, MICH, NY, UC, PH); Lee Co.: *Tracy* 7612 (GH, NY); Monroe Co.: *Killip* 41456 (NY, UC); Pinellas Co.: *Williams* Mar. 12, 1926 (DUKE); Polk Co.: *McFarlin* 5924 (MICH); St. Lucie Co.: *Small* 8507 (GH, NY); ILLINOIS: Jackson Co.: *Vasey* (GH); LOUISIANA: *Hale* (GH); TEXAS: Bexar Co.: *Metz* 771 (MICH); Brazos Co.: *Moncreif* 1476 (TEX); Gonzales Co.: *Tharp* Aug. 12, 1940 (TEX); Harris Co.: *Fisher* Oct. 9, 1917 (UC); Hidalgo Co.: *Walker* 8 (GH, TEX); Jackson Co.: *Warnock* 105 (TEX); Jefferson Co.: *Tharp* Sept. 10, 1937 (GH, TEX); McLennan Co.: *Smith* 59 (TEX); Newton Co.: *Tharp* 52141 (GH); Nueces Co.: *Tharp* and *Brown* 48-165 (TEX); Travis Co.: *Tharp* Nov. 8, 1929 (GH, OKLA, TEX); Willacy Co.: *Johnston* 542221 (TEX); Williamson Co.: *Wolcott* 314 (TEX).

16b. *P. pubescens* L., var. *glabra* (Michx.) Waterfall, comb. nov., based on *P. obscure* Michx., var. *glabra* Michx. Flora Boreali-Americana 1: 149. 1803. *P. obscure* Michx., l.c. *P. hirsuta* Dunal, var. *repandodentata* Dunal, in DeCandolle's Prodromus 13(1): 445. 1852; *P. barbadensis* Jacq., var. *obscura* (Michx.) Rydb., Mem. Torr. Bot. Club 4: 327. 1896; *P. barbadensis* Jacq., var. *glabra* (Michx.) Fernald, RHODORA 51: 82. 1949.

When Michaux described *P. obscure* he immediately divided it into two varieties, var. *glabra* and var. *viscido-pubescent*. The present author interprets var. *glabra* as being the "typical" variety.

This material has been referred recently, by some American authors, to *P. turbinata* Medicus, Academia Theodora-palatina 4: 188-192. 1780. However, in describing this species Medicus says "Die Hauptstamme und nebenaste sind vierkantigt, haarich und rotlich violet-braun." One might dismiss the reddish violet-brown color, as either not necessarily being a characteristic of the whole taxon, or as possibly not being retained in herbarium specimens, but it seems dubious if the term "hairy" would be used to describe nearly glabrous, or slightly puberulent specimens. It seems that the taxon described by Medicus, at least as the name has been applied in our flora, is more likely referable to var. *pubescens*.

Plants glabrous or sparingly puberulent, but not villous as in the other varieties; blades of the principal leaves usually 2-7 cm. long, ovate, often rather broadly so, acuminate in many specimens; margins of the leaves irregularly toothed, sometimes saliently so; petioles about equalling the blades in length; anthers 1.8-2.4 mm. long, bluish; flowering calyx 5-7 mm. long with narrow lanceolate-acuminate lobes 2.5-4 mm. long; flowering peduncles 5-12 mm. long; fruiting calyx 3-4 cm. long, ovate or broader in outline, often acuminate at the apex, on peduncles 1-2 cm. long.

TYPE: In the Herbarium of Michaux, Mus. Hist. Nat., Paris; photograph in the Gray Herbarium.

Variety *glabra* grows in open woods, creek sides, valleys, yards and other disturbed habitats, mostly in southeastern coastal states from North Carolina to Texas, and inland in Arkansas and Missouri; it usually flowers from July through October.

Selected from 47 sheets of 34 collections: ALABAMA: Crenshaw Co.: *Reed* 2103 (TEX); Mobile Co.: *Mohr* Aug. 1883 (MICH); ARKANSAS: Drew Co.: *Demaree* 16498 (NY); Fulton Co.: *Bush* 961 (NY); Hot Springs Co.: *Demaree* 19471 (NY); Logan Co.: *Palmer* 24209 (UARK); Saline Co.: *Moore* 53-311 (UARK); FLORIDA: Dade Co.: *Tatnell* 620 (PH); Gadsden Co.: *Curtiss* 5896 (GH, UC); GEORGIA: Calhoun Co.: *Thorne* 7338 (GH); CALIFORNIA: San Diego Co.: *Jones* March 1882 (PH); LOUISIANA: Calcasieu Parish: *Correll* and *Correll* 9566 (DUKE, GH, NY, PH); Natchitoches Parish: *Palmer* 8777 (PH); Vermilion Parish: *Tharp* July 27, 1929 (TEX); MISSISSIPPI: Okfobeha Co.: *Pollard* 1338 (GH); MISSOURI: Barry Co.: *Bush* 547 (NY); Butler Co.: *Eggert* July 1893 (NY, UC); Madrid Co.: *Bush* 189 (GH, NY); NORTH CAROLINA: *Curtis* (GH); PENNSYLVANIA: Bucks Co.: *Moyer* (PH); TEXAS: Bowie Co.: *Heller* and *Heller* 4253 (GH, NY, PH); Harris Co.: *Hall* 503 (GH, NY); Newton Co.: *Tharp* 42-141 (GH, TEX); Orange Co.: *Tharp* 2518 (TEX); Rusk Co.: *Reverchon* 3239 (NY).

16c. ***P. pubescens*** L., var. ***integritifolia*** (Dunal) Waterfall, comb. nov., based on *P. hirsuta* Dunal, var. *integritifolia* Dunal, in DeCandolle, Prodromus 13(1): 445. 1852.

Plants more or less villous; leaf blades often entire, sometimes 3-4 (rarely more) more or less prominent teeth on each side, translucent or semitransparent; fruiting calyx 2-3 cm. long on peduncles 5-9 mm. long.

Included here are the plants, primarily of the northeastern United States, which have been referred to *P. pubescens* by recent American authors.

TYPE: "Physalis, n. 30, un. itin., Frank e sylvaticis agri Cincinnati civ. Ohio," presumably in the De Candolle collection in the Conservatoire et Jardin Botaniques, Genève, Switzerland.

Variety *integritifolia* grows on creek banks, lake shores, woods, hills and various disturbed habitats, mostly from Pennsylvania to Iowa and south to Florida and south central Texas, but also in southern New Mexico, Arizona and California; it is less frequent in southeastern United States than var. *pubescens*.

Selected from 166 sheets of 132 collections: ALABAMA: Jefferson Co.: *Karle* June 18, 1890 (NY); Tuscaloosa Co.: *Pollard* and *Mazon* 331 (GH); ARIZONA: Pima Co.: *Toumey* Aug. 30, 1895 (UC); ARKANSAS: Baxter Co.: *Moore* 510540 (OKLA, UARK); Clay Co.: *Demaree* 20311 (OKLA, NY, UC); Crawford Co.: *Demaree* 15300 (NY); Garland Co.: *Demaree* 16190, 21841, 20422 (NY); Newton Co.: *Moore* 430237 (OKLA, UARK); Perry Co.: *Demaree* 20168 (NY); Polk Co.: *Moore* and *Williams* Aug. 15, 1951 (UARK); Pulaski Co.: *Demaree* 16640 (NY); Sevier Co.: *Demaree* 9913 (NY, UC); Union Co.: *French* 500150 (UARK); Washington Co.: *Giles* 429 (UARK); Yell Co.: *Demaree* 20109 (NY); CALIFORNIA: Colusa Co.: *Stinchfield* 460 (NY); Imperial Co.: *Thomas* (GH, NY); Lake Co.: *Baker* 11226 (UC); San Diego Co.: *Orcutt* Mar. 6, 1883 (MICH); Tulare Co.: *Congdon* Oct. 8, 1881 (UC); FLORIDA: Dade Co.: *Small* and *Moiser* 5902 (GH,

NY); Leon Co.: *Godfrey* 52473 (DUKE); ILLINOIS: Adams Co.: *Seymour* Sept. 26, 1876 (DUKE); Massac Co.: *Gleason* 2630 (GH); INDIANA: Grant Co.: *Deam* 15287 (NY); Lawrence Co.: *Kriebel* 2564 (DUKE); Putman Co.: *Banker* 1499 (NY); Tippecanoe Co.: *Bool* Oct. 6, 1895 (GH); Whitley Co.: *Friesener* 16539 (GH, NY); KANSAS: Riley Co.: *Norton* 366 (GH, NY); KENTUCKY: Bell Co.: *Lloyd* Aug. 10, 1888 (NY); Hickman Co.: *McFarland* and *Anderson* 2223 (NY); MARYLAND: Montgomery Co.: *Blanchard* Aug. 12, 1892 (NY); Worcester Co.: *Canby* Sept. 1863 (NY); MASSACHUSETTS: Suffolk Co.: *Perkins* Sept. 6, 1881 (NEBC); MISSOURI: Butler Co.: *Eggert* July 1893 (UC) on sheet with var. *obscura*; Jackson Co.: *Bush* 6423 (GH, NY); Jasper Co.: *Demaree* 4424 (OKLA, UARK); Moniteau Co.: *Steyermark* 70814 (UARK); Newton Co.: *Palmer* 32492 (NY); Osage Co.: *Jeffrey* 366 (GH); Phelps Co.: *Kellogg* 196 (NY, TEX, UC); St. Louis Co.: *Eggert* Aug. 14, 1891 (TEX, UC); NEW MEXICO: *Rusby* 310, Burro Mts. (GH, NY); NORTH CAROLINA: Brunswick Co.: *Blomquist* 4811 (DUKE); Carteret Co.: *Lewis* 234 (NY); Washington Co.: *Correll* 1921 (DUKE); OHIO: *Moldenke* 13543 (OKLA); Franklin Co.: *Gleason* Sept. 5, 1904 (GH); Hamilton Co.: *Lloyd* 2209 (MICH); Lake Co.: *Werner* 141 (GH); OKLAHOMA: Cherokee Co.: *Waterfall* 9661 (OKLA); Delaware Co.: *Wallis* 2732 (OKLA); Johnston Co.: *Houghton* 3572½ (NY); Murray Co.: *Hopkins* and *Cross* 6429 (OKL); Muskogee Co.: *Waterfall* 10139 (OKLA); Ottawa Co.: *Stevens* 2530 (GH, NY); Payne Co.: *Thompson* 82 (OKLA); PENNSYLVANIA: Allegheny Co.: *Porter* Aug. 28, 1896 (GH, NY); SOUTH CAROLINA: Berkeley Co.: *Godfrey* and *Tryon* 622 (GH, NY); TENNESSEE: Cheatham Co.: *Svenson* 10395 (UC); Davidson Co.: *Svenson* 9494 (GH); Hamilton Co.: *Clalngh* 101 (DUKE); TEXAS: Cameron Co.: *Johnston* 542210 (TEX); Dallas Co.: *Reverchon* 382 (GH); Gonzales Co.: *Tharp* 51-467 (OKLA, TEX); Jackson Co.: *Warnock* 105 (NY); Travis Co.: *Armor* 5508 (OKLA) approaching var. *pubescens*; Willacy Co.: *Davis* and *Johnston* 53256.15 (TEX); VIRGINIA: Henrico Co.: *Fernald* and *Long* 12794 (GH); Isle of Wight Co.: *Fernald* and *Long* 13442 (GH); James City Co.: *Fernald* and *Long* 13441 (GH); Loudon Co.: *Holms* Aug. 1888 (ARIZ, NY); Nansemond Co.: *Fernald* and *Long* 10810 (GH); Northampton Co.: *Canby* Sept. 1878 (NY); Page Co.: *Steele* and *Steele* 197 (GH, NY); Princess Anne Co.: *Fernald* and *Long* 4167, 4168, 10809 (GH); WEST VIRGINIA: *Mertz* Sept. 22, 1878 (NY).

16d. *P. pubescens* L., var. *grisea* Waterfall, var. nov., Planta grisea, nunc villosa nunc brevipilosa, nunc glandulari-farinacea; foliis ovatis sinuato-dentatis; calycibus fructu a pendunculis 5-9 mm. longis.

Stems densely covered with long, jointed hairs, or with long and short hairs mixed, or densely short viscid-hairy; leaves usually short hairy, sometimes with granular glands, the surfaces having a greyish appearance; leaf blades ovate, coarsely and irregularly 6-9 dentate, or sinuate dentate nearly to their bases; fruiting calyces on peduncles 5-9 mm. long.

This is the taxon, primarily of the northeastern United States, that has been passing as *P. pruinosa* L. However the photograph of the type of *P. pruinosa* in the Arnold Arboretum of Harvard University shows a plant with a more prominent acumination of the leaf blade, and a much longer flowering peduncle than is found in any of our material. The author has been unable to determine the application of the name, *P. pruinosa*. He has seen no material comparable with the photograph of the type.

TYPE: *Walter Deane* Sept. 24, 1884, Cambridge, Mass. (GH; isotype: NY).

Variety *grisea* grows on mountainsides, wooded slopes, roadsides, in gardens and various disturbed habitats, principally in northeastern United States; it usually flowers in August, September and October.

Selected from 114 sheets of 102 collections: CANADA—ONTARIO: *Macoun 54524* (ny); UNITED STATES—ALABAMA: Baldwin Co.: *Dukes 118* (ny); CALIFORNIA: Inyo Co.: *Roos and Roos 6221* (uc); CONNECTICUT: New Haven Co.: *Blewitt 1381* (nebc); DELAWARE: New Castle Co.: *Latnall 1882* (gh); FLORIDA: *Chapman* (ny); GEORGIA: DeKalb Co.: *Small Aug. 1-6, 1895* (ny); ILLINOIS: DuPage Co.: *Umbach 12484* (gh); Macon Co.: *Mills Sept. 29, 1940*; INDIANA: Lawrence Co.: *Kriebel 2538* (DUKE, GH); KANSAS: *Imler 68* (ny); KENTUCKY: *Short 1840* (ny); MAINE: Cumberland Co.: *Chamberlain 1127* (nebc); MASSACHUSETTS: Barnstable Co.: *Collins 950* (nebc); Bristol Co.: *Hervey* (nebc); Dukes Co.: *Bicknell 7704, 7706, 7693* (ny); Essex Co.: *Morong Aug. 1, 1868* (ny); Hampshire Co.: *Torrey and S.J.E. Sept. 16, 1943* (DUKE); Middlesex Co.: *Fernald Sept. 26, 1908* (gh); Nantucket Co.: *Flynn July 30, 1904* (nebc); Norfolk Co.: *Kidder Aug. 23, 1888* (nebc); Plymouth Co.: *Williams Aug. 21, 1898* (nebc); Suffolk Co.: *Young Sept. 1878* (gh, nebc); Worcester Co.: *Woodward 2* (gh); MICHIGAN: St. Claire Co.: *Dodge Aug. 25, 1906*; MISSOURI: Barry Co.: *Bush 564, 469* (ny); Christian Co.: *Blankenship Aug. 1, 1895* (gh); Jackson Co.: *Mackenzie 7* (mich); Jasper Co.: *Bush 10402* (gh, ny); Taney Co.: *Bush 170* (gh); NEW JERSEY: *Hastings Sept. 6, 1917* (ny) foot of Palisades; NEW YORK: Chemung Co.: *Lucy 7825, 11098* (ny); Oswego Co.: *Sheldon 6008* (uc); Tompkins Co.: *Hoisington 312* (okl); Washington Co.: *Burnham Sept. 25, 1896* (gh); NORTH CAROLINA: Granville Co.: *Godfrey 2060* (gh); Jackson Co.: *Thaxter June-July 1887* (gh); Swain Co.: *Beardslee and Kofoed Aug. 15, 1891* (gh); OREGON: Tillamook Co.: *Lloyd Sept. 10, 1894* (ny); PENNSYLVANIA: Bucks Co.: *Fretz Sept. 7, 1901* (gh); Lancaster Co.: *Small Sept. 1889* (gh); Westmoreland Co.: *Shafer and Medayer 182* (uc); RHODE ISLAND: Providence Co.: *Leland Sept. 18, 1881* (nebc); TENNESSEE: Knox Co.: *Ruth 3411* (ny); TEXAS: De Witt Co.: *Riedel Aug. 3, 1941* (tex); VERMONT: Bennington Co.: *Ames May 1885* (mich); Chittenden Co.: *Flynn 3* (gh); Rutland Co.: *Egglesston 1510* (gh, nebc); VIRGINIA: Bedford Co.: *Curtiss Oct. 3, 1871* (gh); Page Co.: *Steele and Steele Aug. 28, 1901* (gh, ny); WASHINGTON: Klickitat Co.: *Suksdorf 2285* (ny); Yakima Co.: *Henderson 2496* (gh).

17. *P. foetens* Poirer, var. *neomexicana* (Rydb.) Waterfall, comb. et stat. nov., based on *P. neomexicana* Rydb., Mem. Torr. Bot. Club 4: 325-326. 1895.

Plants annual, 10-60 cm. tall, usually branched; indument short (0.5-1 mm. long) and usually dense, more or less yellowish or brownish capitate-glandular; leaf blades 3-6 cm. long, ovate to oblong-ovate or lanceolate-ovate, their margins toothed, or sometimes sinuate-toothed; petioles one-half to three-fourths as long as the blades; corollas 6-7 mm. long, bluish spotted; anthers (0.3) 1-1.5 (2) mm. long, bluish, on filiform filaments; flowering calyces 3-4.5 mm. long, on peduncles usually 1.5-3 mm. long; fruiting calyces 2-3 cm. long, more or less ovate in outline, sharply 5-angled, on peduncles mostly 4-7 mm. long.

This variety differs from var. *foetens* of Mexico primarily in its shorter anther-length (2-3 mm. in var. *foetens*), usually shorter corolla (as much as 1 cm. long in some Mexican material) and in having fewer yellowish or brownish capitate glands than var. *foetens*.

TYPE: In describing *P. neomexicana*, Rydberg cited several collections, but designated none of them as type. From among those cited, *Fendler* 678 (GH) is selected as the LECTOTYPE. A second sheet of the same collection, an isolectotype, is in the same herbarium.

Variety *neomexicana* grows in the mountains, often with junipers and pines, and in adjacent areas, including cultivated fields, in New Mexico and adjacent Colorado and Arizona; it flowers in June through October.

Selected from 48 sheets of 40 collections: ARIZONA: Graham Co.: *Bohrer* 409 (ARIZ); Greenlee Co.: *Gould and Haskell* 4080 (UC); Maricopa Co.: *Rusby* 310 (MICH); Navajo Co.: *Wooton* September 13, 1913 (ARIZ); Pima Co.: *Toumey* Aug. 30, 1894 (NY); Yavapai Co.: *Wilcox* Sept. 1918 (ARIZ); COLORADO: *Porter* July 1872 (PH); El Paso Co.: *Livingston* 497 (DUKE); NEW MEXICO: Colfax Co.: *Standley* 13869 (NY); Bernalillo Co.: *Ellis* 287 (NY); Grant Co.: *Rusby* Oct. 1881 (MICH); Lincoln Co.: *Skeahan* 60 (GH, NY); *Wooton* 633, 635 (NY); Rio Arriba Co.: *Parker and McClintock* 6449 (ARIZ, UC); San Miguel Co.: *Standley* 4920 (GH, NY), *Nelson* 11568 (UC); Santa Fe Co.: *Heller and Heller* 3803 (GH, NY); Sierra Co.: *Metcalfe* 1210 (GH, NY, UC); Socorro Co.: *Metcalfe* 425 (NY); Torrance Co.: *Parker and McClintock* 6529 (NY); Socorro or Grant Co.: *Rusby* 309, Mogollon Mts. (MICH).

18. *Physalis latiphylla* Waterfall, sp. nov. Planta annua, 15–45 cm. alta, ramosa, plus minusve villosa; foliorum laminis 5–7 cm. longis, ovatis vel ovatis-rotundis, integris vel paucidentatis, acuminatis; corollis maculatis, 4–6 mm. longis; antheris coeruleis, 1.5–2 mm. longis; calycibus fructu (2.5) 3–4 cm. latis; pedunculis 1–1.5 cm. longis.

Annual, 15–45 cm. high, branched, more or less villous; blades of the principal leaves 5–7 cm. long, ovate to ovate-rotund, thin and translucent, their margins from entire to having a few teeth, acuminate; petioles 1.5–7 cm. long; corollas yellow, dark-spotted, small, 4–6 mm. long; flowering calyces 3–4 mm. long with lobes about half that long, on peduncles 3–8 mm. long; fruiting calyces sparsely appressed-hairy, strongly 5-angled, 2.5–4 cm. long and (2.5) 3–4 cm. wide; fruiting peduncles 1–1.5 cm. long; linear-subulate calyx lobes 7–10 mm. long, extending 5–7 mm. beyond the body of the inflated fruiting calyx.

TYPE: *T. H. Kearney and R. H. Peebles* 14425, Rondstadt Ranch, plain east of Baboquivari Mts., Pima Co., Arizona, Sept. 23, 1939. It is deposited in the Herbarium of the University of Arizona.

In addition to the type, the following collections have been seen: ARIZONA: Pima Co.: *Bartram* 237 Santa Catalina Mts., east of Pima Canyon, Jan. 16, 1920 (PH); *Kearney and Peebles* 10427, Toro Canyon, Baboquivari Mts., Sept. 30, 1934 (ARIZ, MICH); *Kearney and Peebles* 14932, South Canyon, Baboquivari Mts., Aug. 31, 1940 (ARIZ); Santa Cruz Co.: *Harrison and Hope* 9058, Forty miles south of Tucson on Sasabe Road, Sept. 11, 1932 (ARIZ); *Harrison and Fulton* 8158, Nogales, Aug. 30, 1931 (ARIZ); County undetermined; *Harrison* 9058, Robles to San Fernando, Sept. 10, 1932 (GH, MICH); *Harrison, Kearney and Hope* 8950 half-way from Sasabe to Robles, Aug. 21, 1932 (ARIZ); *Kearney and Peebles* 10576, Florida Canyon, Santa Rita Mts., Oct. 7, 1934 (ARIZ).

19. *Physalis missouriensis* Mackenzie and Bush, Trans. Acad. Sci. St. Louis 12: 84–85. 1902.

Annual, usually branched above, villous, sometimes with shorter hairs, often somewhat viscid; principal leaf blades 2-6 cm. long, ovate to narrowly ovate, dentate to sinuately dentate, or sometimes entire; petioles one-third the length of, to nearly as long as the blades; corolla yellow, not dark spotted, 7-10 mm. long; anthers (0.6) 1-1.2 mm. long, bluish, on slender filaments; flowering calyx 3-4 mm. long, its lobes 1-2 mm. long, on peduncles 3-6 mm. long; fruiting calyx 1.5-2.5 cm. long, ovoid, on peduncles 5-10 mm. long.

This species is easily distinguished from *P. pubescens* by its unspotted corollas and its smaller anthers.

TYPE: K. K. Mackenzie 485, Rocky soil, Red Bridge, Jackson Co., Missouri. The type was deposited in the "Herbarium of K. K. Mackenzie." Isotypes: GH, MICH, WIS.

P. missouriensis grows in rocky woods and limestone barrens, mostly in Missouri, northeastern Kansas, western Arkansas, with two collections from adjacent Oklahoma, and one collection, dubiously referred here, from southwestern Texas; it flowers from June through October.

Collections examined: ARKANSAS: Carroll Co.: Palmer 29310 (UARK); Hempstead Co.: Palmer 8955 (PH); Washington Co.: Moore 3008 (UARK); Moore and Iltis 430209 (OKLA, UARK); Giles 404 (UARK); J. T. B. 645 White River (UARK); KANSAS: Douglas Co.: Snow 2210 (KANU); McGregor 9703 (KANU); Marshall Co.: Horr 4610 (KANU); Riley Co.: Gates 18566 (GH, TEX, UC); Hitchcock 402 (GH); Shawnee Co.: Volle 737 (KANU); MISSOURI: Barry Co.: Bush 162 (OKL); Jackson Co.: Bush June 27, 1887 (GE), Aug. 1888 (GH, NY); 772 (GH, NY), 4079 (GH), 7334 (GH), 7695 (GH, NY), 12298 (NY), 12298A (NY); Mackenzie 360 (NY), Aug. 23, 1896 (GH, NY); 485 (MICH); Jefferson Co.: Prince July 4, 1883 (GH); Phelps Co.: Kellogg Oct. 22, 1913 (TEX); Platte Co.: Bush 11804 (NY); St. Louis Co.: Eggert July 20, 1887 (GH), Aug. 21, 1891 (NY); Pennell 11701 (PH); Taney Co.: Bush 173 (GH, NY); County undetermined; Blankenship 1893 (NY); Nelson 5 (NY); OKLAHOMA: Muskogee Co.: Little 2568 (OKL); Ottawa Co.: Stevens 2351 (GH, on sheet with Stevens 2530, *P. pubescens*); TEXAS: Brewster Co.: Cory 25570, five and three-quarter miles east of Alpine, Sept. 19, 1940 (GH) is somewhat doubtfully referred to this taxon.

20. **Physalis Greenei** Vasey and Rose, Contr. U. S. Natl. Herb. 1: 18. 1890; *P. pedunculata* Greene, Pittonia 1: 268-269. 1899, non Mart. and Gal., Bull. Acad. Brux. 12: 132. 1842.

Annuals, villous or short pilose, glandular and viscid; principal leaf blades 2-4 cm. long, ovate; petioles one-half as long as to slightly longer than the blades; leaf margins dentate to sinuate-dentate, or rarely entire; corolla 8-10 mm. long, yellowish, or sometimes with a slightly darker tinge; anthers 1.5-2.5 mm. long, yellow, on slender filaments; flowering calyx 3-4 mm. long on peduncles 15-30 mm. long; fruiting calyx 2-2.5 cm. long, pointed-ovoid, on peduncles 15-40 cm. long.

The smaller anthers of this species will serve to distinguish it, and separate it from *P. crassifolia* in those instances in which they tend to resemble each other.

TYPE: Charles F. Pond Feb. 1889, Cedros Island, off the coast of Lower California; "southwest side of the island" according to Greene; type and isotype (US).

P. Greenei grows on hills and sea-cliffs, southern California; it flowers in February, March and April.

Collections examined: CALIFORNIA: Orange Co.: Abrams June 12, 1901 (NY); Mason 2933 (GH, UC); Placer Co.: Jones 88 (GH); San Diego Co.: Abrams 3309 (GH, NY, PH, UC, US); Allen 77 (GH); Jones March 1882 (GH, UC); Wiggins 1821 (UC).

21. *Physalis lobata* Torrey, Ann. Lyce. Nat. Hist. New York 2: 226-227. 1828; *Quincula lobata* (Torr.) Rafinesque, Atlantic Journal, 1: 145. 1832; *P. sphaerana* Buckley, Proc. Acad. Sci. Phil. 14: 6. 1863; *Chamaesaracha physaloides* Greene, Bull. Torr. Bot. Club 9: 122. 1882; *Quincula lepidota* Aven Nelson, Bot. Gaz. 47: 430. 1909.

Chamaesaracha physaloides is included here on the basis of Greene's phrase "flat scale-like hairs," which seems to be a good description of the appearance of the characteristic crystalline vesicles of *P. lobata* after they are dried. These structures are not found on *P. Wrightii*, the other species to which this name has been referred.

Perennial, branching from the base, the branches spreading or procumbent; indument consisting of a varying amount of crystalline vesicles, flattening when dried, which may be abundant enough to give the plant a scurfy appearance, or may be very sparse; principal leaves usually 4-10 cm. long, with blades usually 0.5-3 cm. wide, ovate-lanceolate to linear-lanceolate, cuneate at the base to a winged petiole; usually pinnatifid, rarely sinuate-toothed or entire; corollas blue or violet (rarely white), rotate, 1.5-2 cm. broad, with five hairy pads on its base near the point of attachment of the filaments and alternating with them; anthers about 1.5-2 mm. long, yellow, on slender filaments; style twisted and bent to one side; flowering calyx 3-4 mm. long, its lobes 1.5-2 mm. long, deltoid; flowering peduncle 1-3 (5) cm. long; fruiting calyx 1.5-2 cm. long, pentagonal-ovoid, inflated, on peduncles 1-2.5 (3) cm. long; seeds usually somewhat crenate on their backs.

TYPE: James "On the Canadian"; not seen.

P. lobata grows on plains, prairies, mesas, canyons, juniper barrens, desert areas and various disturbed habitats principally in western Kansas, Oklahoma and Texas, and eastern Colorado and New Mexico, and southern Arizona.

Three hundred forty seven sheets of 275 collections have been seen from: Arizona, California (Fremont's Expedition in 1845), Colorado, Kansas, Nevada (Clark Co.), New Mexico, Oklahoma and Texas.

A white-flowered forma is rarely found. It may be described as *P. lobata* Torr., forma *albiflora* Waterfall, f. nov., corollis albis. TYPE: J. J. Thornber Aug. 11, 1901, Experiment Station Range Reserve, Pima County, Arizona (ARIZ.). Another collection is B. C. Tharp and C. Harvard 49344, 5-6 miles west of Del Rio, Valverde Co., Texas, April 16, 1949 (TEX).

22. *Physalis Carpenteri* Riddell ex Rydberg, Mem. Torr. Bot. Club 4: 330-331. 1896; *P. Carpenteri* Riddell, N. Orl. Med. and Surg. Journ. 759. 1852, as a *nomen nudum*; Bot. Gaz. 3: 11. 1847 in synonymy.

Plant over two-thirds of a meter tall, widely branched; herbage short-hairy, the leaf blades sometimes nearly glabrous and the calyces sometimes with a few long hairs; principal leaf blades (3) 7-11 cm. long, ovate to lanceolate-ovate, acuminate; petioles one-third to two-thirds as long as the blades; leaf margins usually entire, sometimes repand; flowers from single to 3-6 in the axils of the leaves; the fascicled flowers apparently due to the presence of a

telescoped axillary branch, sometimes 2–4 cm. long and bearing reduced leaves (*Curtiss 6901*: UC, GH, NY) as well as flowers; corolla about 1 cm. long, yellow; anthers about 2 mm. long, yellow, on slender filaments; flowering calyx 4–5 mm. long on peduncles 5–8 mm. long; fruiting calyx about 1.5 cm. in diameter, nearly spherical, only slightly inflated; fruit having 1 to several plump, rounded, corky, seed-like bodies (possibly a peculiar development of unfertilized ovules) in addition to the normal, more or less reniform, flattened seeds.

The species may be annual, according to some collectors, or from a deep-seated "rootstock" according to others; all the specimens examined were branches only.

The author prefers to leave this species in *Physalis*, regardless of its peculiar characteristics, until a more thorough study of related genera, or possible subgenera, can be made.

Collections examined: ALABAMA: S. B. Buckley, April (NY); FLORIDA: Columbia Co.: Geo. V. Nash 2503, Aug. 29–31, 1895 (GH, MICH, NY); Erdman West, seeds from Fort White, raised by Margaret Young Menzel as her 508a (TEX); Escambia Co.: Curtiss, 1886, Pensacola (GH); Suwanee Co.: A. H. Curtiss 6901, annual 2 ft. high and widely branched, growing in a cultivated field near Wellborn, Sept. 14, 1901 (GH, NY, UC); County undetermined: M. A. Curtis, Florida?; LOUISIANA: East Feliciana Parish: Riddell, March 1878 (GH, one fruiting calyx); Orleans Parish: Drummond New Orleans (GH); Ingalls in 1835, New Orleans (NY); West Feliciana Parish: R. S. Cocks, 3603, common in rich woods (NY).—DEPT. OF BOTANY AND PLANT PATHOLOGY AND THE RESEARCH FOUNDATION, OKLAHOMA STATE UNIVERSITY, STILLWATER, OKLAHOMA.

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× CAREX DEAMII IN MISSOURI.—This interesting sedge was described by Hermann (RHODORA 40: 81, 1938) as a hybrid between *C. Shortiana* and *C. typhina* from Pike County, Indiana. The hybrid has thicker spikes (7–8 mm. wide) and longer beaks (1–1.5 mm. long) of the perigynia than are found in *C. Shortiana*.

It may now be recorded from Missouri on the basis of the following three collections, all in the herbarium of the Chicago Natural History Museum: Allenton, St. Louis Co., July 30, 1887, G. W. Letterman (specimen on right hand side of sheet); swaley margin of shallow sinkhole pond on wooded upland, T 23 N, R 8 W, west part of sect. 15, 4 mi. south of West Plains, Howell Co., June 25, 1955, Steyermark 78724; low wet woods in valley of Old Chariton River and bordering New Chariton River where swamp existed but is obliterated, T 62 N, R 16 W, SW $\frac{1}{8}$ sect. 27, 2½ mi. south of Youngstown, Adair Co., Sept. 19, 1955, Steyermark 79705. At the last locality both *C. squarrosa* and *C. typhina* were present, but at the Howell County locality only one of the putative parents, *C. Shortiana*, assigned by Hermann, was present, represented by Steyermark 78725. Instead of *C. typhina*, the other putative parent assigned by Hermann, there was present *C. squarrosa*, represented by Steyermark 78723. It is interesting, therefore, to record a different putative parent at the Missouri locality, i.e., *C. squarrosa*, rather than the one found by Hermann at the Indiana station for × *C. Deamii*.

As this hybrid eventually becomes collected elsewhere, it will be interesting to learn which of the putative parents predominate. The morphological distinctions effected by the hybridization of *C. typhina* and *C. Shortiana* apparently cannot be differentiated from those effected by the union of *C. squarrosa* and *C. Shortiana*. While admittedly *C. squarrosa* and *C. typhina* are related species, separated chiefly by the spreading-divaricate vs. ascending beaks of the perigynia, one would expect some marked differences between the hybrids resulting from crosses of each one of these species with *C. Shortiana*.—JULIAN A. STEYERMARK, CHICAGO NATURAL HISTORY MUSEUM AND MISSOURI BOTANICAL GARDEN.

AN ALBINO FORM OF DIPSACUS SYLVESTRIS.—While botanizing an undeveloped section of Mt. Hope Cemetery in Chicago, Mr. Karl E. Bartel discovered a colony of over fifty plants of a white-flowered *Dipsacus sylvestris*. Over one hundred heads of flowers

were counted. Only one stunted lavender-flowered plant was noted in the group.

Since most other white-flowered plants are recognized with a formal name, it is consistent to provide a name for the present white-flowered teasel.

Dipsacus sylvestris Huds., f. **albidus** Steyermark., forma nova. A forma *sylvestris* recedit corollis albidis.—Illinois: Mt. Hope Cemetery, 115th St., Chicago, Cook Co., Aug. 25, 1957, *Karl E. Bartel 1*, HOLOTYPE, in Herb. Chi. Nat. Hist. Mus.—JULIAN A. STEYERMARK, CHICAGO NATURAL HISTORY MUSEUM AND MISSOURI BOTANICAL GARDEN

TWO NEW STATIONS FOR CAREX PICTA. This rare sedge of anomalous structure was discovered more than a century ago near New Orleans by Drummond. Since then it has been detected in Winston County, Alabama, and in five adjacent counties in south-central Alabama. These are the only stations reported by Mackenzie in North American Flora (1935); if other stations in the southern states have been discovered in the last twenty years they are at present unknown to me. Few sedges have such a disjunct distribution, and these three widely separate areas suggest the possibility of its occurrence in suitable localities in Kentucky, Tennessee, and Mississippi.

Carex picta steud. was collected March 18, 1955, by a stream in woods near Meridian, Lauderdale County, Mississippi, by G. R. Cooley, A. S. Pease, and James D. Ray, Jr., number 3178. On March 29, 1956, Cooley and Ray collected it again in a wooded ravine opening into Tanyard Branch, north of Cross Road, Tishomingo County, Mississippi. These two stations are about 175 miles apart, while the second one is about 75 miles northwest of the known Alabama station. Specimens will be deposited at the Gray Herbarium, the New York Botanical Garden, and Mississippi State College.

The plant blooms early and must be very conspicuous at that time, due to its large clavate spikes with deep red scales. It is one of the few sedges which can be identified without perigynia. The plants are strictly dioecious and each flowering culm bears a single spike. The basal scale of the spike is somewhat elongate and almost completely surrounds the rachis.—
H. A. GLEASON, GREENWICH, CONN.

A NEW BRYOPHYTE FLORA¹. With this publication, A. LeRoy Andrews has filled a long existing lacuna in both bryology and plant geography. The work is to bryologists, what the *FLORA OF THE CAYUGA LAKE BASIN, NEW YORK*, by K. M. WIEGAND AND A. J. EAMES is to students of the vascular plants.

Begun by the author in 1908, the publication under review represents a thorough survey of a relatively small, but botanically important area. Dr. Andrews has collected most of the species found in the region by such botanists as Atkinson, Brewer, Brown, Cipperly, Dudley, Durand, Graham, Jackson, Kellerman, Nanz, Pratt, Rowlee, Schuster, Whetzel, Wiegand, and Winne. Several species not previously reported from the area have been found by the author and are treated in this flora. Only specimens actually seen by Dr. Andrews are definitely cited; any others are listed as "reported."

Since Wiegand and Eames, in their previously mentioned work, described the geological and physiographical features of the region in considerable detail, these matters are given brief treatment.

The distribution and local site of each species is given as well as the names of collectors and dates of collection.

In the matter of nomenclature, Dr. Andrews begins with Linnaeus' *SPECIES PLANTARUM* of 1753 and observes the rule of priority "with some concessions in doubtful instances and no unfamiliar names."

The keys, which should be of considerable help to students of New England bryophytes, are of excellent quality—brief and concise. A list of references pertaining to the bryophytes of the region is given. This work, a valuable piece of research, should be in the library of all readers of *RHODORA*, bryologists, and students of plant geography.—FRANK J. HILFERTY, DEPARTMENT OF BIOLOGICAL SCIENCES, MASSACHUSETTS STATE TEACHERS COLLEGE, BRIDGEWATER, MASS.

¹ THE BRYOPHYTE FLORA OF THE UPPER CAYUGA LAKE BASIN, NEW YORK by A. LeRoy Andrews, Professor Emeritus of German and Honorary Curator of the Bryological Collections of the Wiegand Herbarium, at Cornell University. Cornell University Experiment Station, Cornell University, Ithaca, New York, 1957; 87 pp.

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